

Creative Computing

THE #1 MAGAZINE OF COMPUTER APPLICATIONS AND SOFTWARE

IBMPCAT
versus
Compaq Deskpro

IN-DEPTH EVALUATIONS:

ISM Express**Juki 6300 Printer****WordStar 2000 Plus****MSBasic 2.0 For The Mac**

A New Approach To The Knight's Tour

Tutorial:

MSBasic 2.0 For The Mac

How a Consulting Engineer Uses Lotus

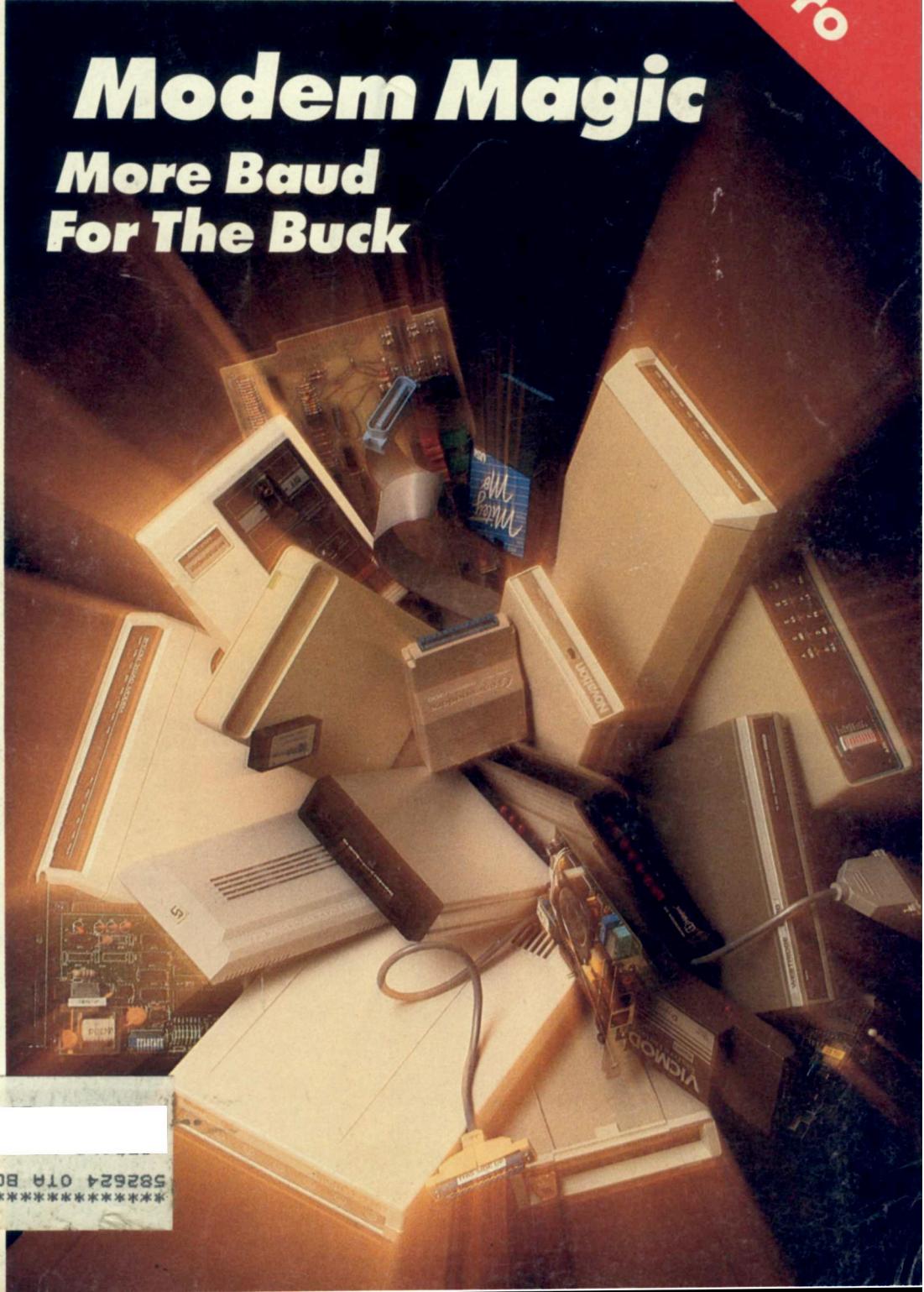
Try This Escher Sketch Pad

Color Computer Enhanced Keyboard

Columns: Apple, Atari, IBM, Tandy, Industry Insider, New Products

Modem Magic

More Baud For The Buck



12569

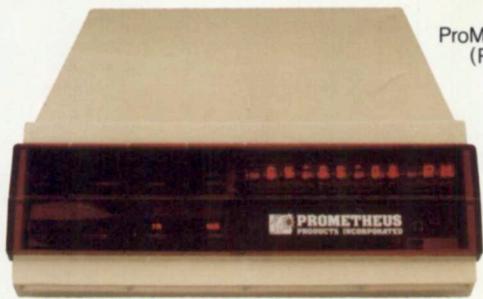
054E7

582624 OTR B0168095 6415 OCTBS
*****-*****-5-DIGIT 125690
14024 14044

ProModem 1200...

HOT-LINE

Our ProModem 1200 Makes Smart Modems Look Dumb

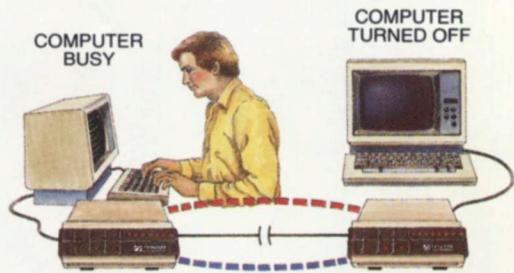


ProModem 1200
(RS-232)



ProModem 1200M
(Macintosh)

Send Or Receive 50 Pages Of Text Without Tying Up Your Computer



No wonder Smart Modems, Cats, and Maxwells cringe when compared to our \$495 ProModem 1200, an expandable 1200/300 baud modem for use with all personal computers. It costs less, but is smarter than the rest.

And when you add our \$99 Communications Buffer and Alphanumeric Display options, ProModem 1200 becomes a veritable genius!

Imagine, you unplug your computer, take it home for the weekend, and while you're gone, ProModem 1200 answers the phone, collects messages up to 50 pages long, sends out electronic mail, and displays all events with the exact time of each. Thanks to ProModem 1200, expensive, hard-to-use communications software isn't needed. The communications is in the modem, and electronic mail becomes a background function, where it belongs.

Simple To Install And Use

Our Communications Buffer is a 4 by 6 card that plugs into the ProModem 1200 motherboard. It comes with 2K of CMOS battery backed-up memory, expandable to 64K. Part of the memory is used as a dialing directory with the balance reserved for storage. For \$99 more, a front panel Alphanumeric Display can be added to show time, date, and 24 status and help messages. These two powerful options can be included at time of purchase, or can be added later.

Hayes Compatible

ProModem 1200 is Hayes compatible but that's where the resemblance ends. Our standard \$495 modem includes a real-time clock/calendar. Hayes charges hundreds more for a Smart Modem with a time-base. Nor do they have electronic mail capability at any price.



ProModem 1200 contains a battery backed-up real-time clock/calendar, a large dialing directory and can send or receive messages up to 50 pages long without tying up the computer.

Send for complete details and the name of the Prometheus dealer nearest you.



The Hot Line

PROMETHEUS
PRODUCTS INCORPORATED

4545 Cushing Pkwy. • Fremont CA 94538

CIRCLE 144 ON READER SERVICE CARD

Call Now For
Complete Info...
415/490-2370

Speed, Power, Price. Borland's Turbo Pascal Family.

The industry standard. With more than 250,000 users worldwide Turbo Pascal is the industry's de facto standard. Turbo Pascal is praised by more engineers, hobbyists, students and professional programmers than any other development environment in the history of microcomputing. And yet, Turbo Pascal is simple and fun to use!

Jeff Duntemann, PC Magazine: "Language deal of the century . . . Turbo Pascal: It introduces a new programming environment and runs like magic."

Dave Garland, Popular Computing: "Most Pascal compilers barely fit on a disk, but Turbo Pascal packs an editor, compiler, linker, and run-time library into just 29K bytes of random-access memory."

Jerry Pournelle, BYTE: "What I think the computer industry is headed for: well documented, standard, plenty of good features, and a reasonable price."

Portability. Turbo Pascal is available today for most computers running PC DOS, MS DOS, CP/M 80 or CP/M 86. A XENIX version of Turbo Pascal will soon be announced, and before the end of the year, Turbo Pascal will be running on most 68000 based microcomputers.



\$69.95

High resolution monochrome graphics for the IBM PC and the Zenith 100 computers

Dazzling graphics and painless windows. The Turbo Graphix Toolbox will give even a beginning programmer the expert's edge. It's a complete library of Pascal procedures that include:

- Full graphics window management.
- Tools that will allow you to draw and hatch pie charts, bar charts, circles, rectangles and a full range of geometric shapes.
- Procedures that will save and restore graphic images to and from disk.
- Functions that will allow you to precisely plot curves.
- Tools that will allow you to create animation or solve those difficult curve fitting problems.
- much, much more . . .

\$54.95
NEW

No sweat and no royalties. You may incorporate part, or all of these tools in your programs, and yet, we won't charge you any royalties. Best of all, these functions and procedures come complete with commented source code on disk ready to compile!



\$54.95

Searching and sorting made simple

The perfect complement to Turbo Pascal. It contains: *Turbo-Access*, a powerful implementation of the state-of-the-art B+-tree ISAM technique; *Turbo-Sort*, a super efficient implementation of the fastest data sorting algorithm, "Quicksort on disk". And much more.

Jerry Pournelle, BYTE: "The tools include a B+-tree search and a sorting system; I've seen stuff like this, but not as well thought out, sell for hundreds of dollars."

Get started right away: free database! Included on every Toolbox disk is the source code to a working data base which demonstrates how powerful and easy to use the Turbo-Access system really is. Modify it to suit your individual needs or just compile it and run.

Remember, no royalties!



NOT COPY-PROTECTED

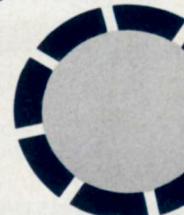
TURBO PASCAL FAMILY

Available at better dealers nationwide. Call (800) 556-2283 for the dealer nearest you. To order by Credit Card call (800) 255-8008, CA (800) 742-1133

Carefully Describe your Computer System!
Mine is: 8 bit 16 bit
 PC-DOS MS-DOS
 CP/M 80 CP/M 86
My computer's name/model is: _____

The disk size I use is:
 5 1/4" 8" 3 1/2"

Name: _____
Shipping Address: _____
City: _____
State: _____ Zip: _____
Telephone: _____



Amount: (CA 6% tax) _____

Payment: VISA MC BankDraft Check

Credit Card Expir. Date: _____ / _____

Name on Card: _____

Card #: _____

F 12

Turbo Pascal is a registered trademark of Borland International, Inc.
Software's Newest Direction
4113 Scotts Valley Drive
Scotts Valley, California 95066
TELEX: 172373

COD's and Purchase Orders WILL NOT be accepted by Borland. California residents: add 6% sales tax.
Outside USA: add \$10 and make payment by bank draft, payable in US dollars drawn on a US bank.

WHEN YOU BUY TIMEWORKS SOFTWARE, YOU GET MORE THAN SOFTWARE.

You get our Customer Technical Support Team

At the other end of our toll-free hotline, you'll find our full-time Customer Technical Support Team. With Timeworks, you get immediate answers . . . free of charge to all registered users. Our Timeworks experts help you use each of our programs to its fullest potential. Not everyone provides this necessary support, let alone for free.

You get our liberal Trade-Up Policy

If, at any time in the future, you wish to buy an updated version of any Timeworks program, or if you upgrade your computer system, you may exchange your original program for any other program we publish. Here's how:

- Purchase your new Timeworks program at your favorite dealer.
- Send us the Timeworks program you wish to trade in, your paid receipt for the new program, and the title of the Timeworks program you would like in exchange. It's FREE OF CHARGE, if the suggested retail price of both programs is the same. Or, include your check or credit card number to cover only the retail price difference between your old program and the one you wish in exchange. Please add \$4.70 for shipping and handling, in either case.
- We'll be glad to furnish a list of Timeworks' suggested retail prices, upon request.



You get our Money Back Guarantee

If you can find anything that works better for you, we'll buy it for you. Simply send us your Timeworks program, your paid receipt, and the name of the program you want, along with your check or credit card number for any retail price difference. If it's available, we'll send it to you.*

Look for these and other Timeworks programs at your favorite dealer. Or contact Timeworks, 444 Lake Cook Road, Deerfield, IL 60015. Phone: (312) 948-9200.

Available for Apple, IBM, Commodore, and Atari computers.**



More power for your dollar

* Offer valid for 90 days from date of purchase.

** Registered trademarks of Apple Computer, Inc., International Business Machines Corporation, Commodore Computer Systems, and Atari, Inc.

© 1985 Timeworks, Inc. All rights reserved.

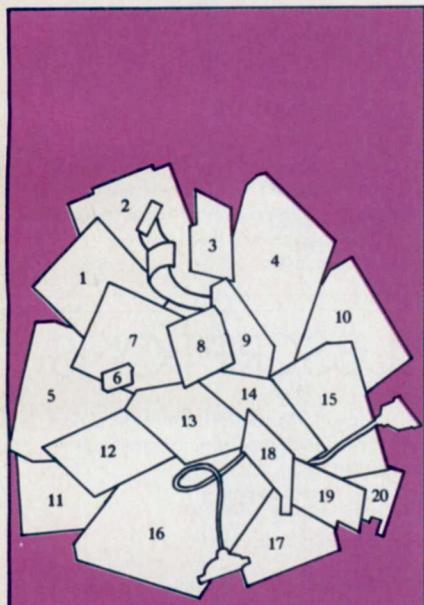
CIRCLE 131 ON READER SERVICE CARD

Nobody offers more services than we do

Creative Computing

COVER STORY

- 14 Modem Magic/Lockwood**
Getting the most baud for your buck



Our cover collage features modems by:

- | | |
|-------------|---------------------|
| 1 Mura | 11 OmniTel |
| 2 Votrax | 12 US Robotics |
| 3 Xtron | 13 Microperipherals |
| 4 Microcom | 14 Hayes |
| 5 Bytcom | 15 Zebra |
| 6 Xecom | 16 MultiTech |
| 7 Apple | 17 Cermetek |
| 8 Commodore | 18 AST Research |
| 9 Novation | 19 Commodore |
| 10 Ark | 20 Bizcomp |

Photography by Jeff MacWright.



PRODUCT REVIEWS

- 32 Compaq Deskpro vs. IBM PC AT/Badgett**
Which one is right for you?

- 39 Juki 6300 Printer/Linzmayer**
A quick, quiet, capable daisywheel

- 42 ISM Express/Lockwood**
Sharp RGB color to go

- 44 WordStar 2000 Plus/Lockwood**
The bionic word processor

- 46 Microsoft Basic 2.0 for the Mac/Hart**
One of the most advanced Basic interpreters available today

NEW PRODUCTS

- 70 What's New in Hardware/Lockwood**
Peripherals—practical and fanciful

- 75 What's New in Software/Lockwood**
Databases and decision support

APPLICATIONS

- 54 Point and Click in Microsoft Basic/Anderson**
A Macintosh Tutorial

- 64 The Knight's Tour/Irwin**
The computer makes some decisions in this new approach to a classic problem

DEPARTMENTS

- 6 Input/Output/Readers**

- 8 Industry Insider/Ahl**
Future views, price erosion, and computer crime

- 12 In Real Time/Staples**
Computers and engineering: a winning combination

- 78 Try This!/Carlson**
Escher sketch pad

- 82 IBM Images/Fastie**
Notes on the AT and hard disk subsystems

- 88 Tandy Gram/Commander**
An enhanced keyboard and screen mode for the Color Computer

- 92 Apple Cart/Anderson**
New products for the Mac

- 94 Outpost:Atari/Small**
Programs for the home, a new adventure, and unsung heroes

STAFF

Founder/Editor-in-Chief:

David H. Ahl

Editor:

Elizabeth B. Staples

Managing Editor:

Peter Fee

Associate Editor:

John J. Anderson

Assistant Editors:

**Owen Linzmayer
Russ Lockwood**

Reviews Editor:

Paul Grosjean

Editor-at-Large:

Ken Uston

Contributing Editors:

**Will Fastie
Susan Glinert-Cole
Danny Goodman
Stephen B. Gray
Glenn Hart
Bill Jacobson
Brian Murphy
Ted Nelson
Tim Onosko
Peter Payack**

Editorial Assistants:

**Jane M. Lewis
Carol A. Crowell**

Associate Art Directors:

**Chris DeMilia
Peter Kelley**

Assistant Art Director:

Eugene Bicknell

Typesetting:

Dianna Mizell

COMPUTER PUBLICATIONS DIVISION

President

Kenneth H. Koppel

Senior Vice President

Eileen G. Markowitz

Vice President, Editorial

Jonathan D. Lazarus

Vice President, Production

Baird Davis

Vice President,

Southeast

Licensing & Special Projects

Mark Browning

Vice President,

P.O. Box 81306

Creative Services

2511 Carroll Ave.

Vice President, Circulation

Atlanta, GA 30366

Vice President,

(404) 455-3430

Circulation Services

Canada

Marketing Manager

Frank Lederer

Business Manager

The Patti Group

Editorial Director

501 Eglinton Ave. E.

James Ramaley

Suite 202

Ronni Sonnenberg

Toronto, Ontario M4P 1N4

Gary A. Gustafson

(416) 482-6288

Ernest F. Baxter

PERMISSIONS

Material in this publication may not be reproduced in any form without permission. Requests for permission should be directed to Jean Lamensdorf, Ziff-Davis Publishing Company, One Park Avenue, New York, New York 10016.

ADVERTISING SALES

Publisher

William S. David
One Park Ave.
New York, NY 10016
(212) 503-5026

Advertising Coordinator

Desirée Sample
One Park Ave.
New York, NY 10016
(212) 503-5030

Northern California/Northwest

Janet Bish
11 Davis Dr.
Belmont, CA 94002
(415) 598-2290

Southern California/Southwest

Anne Abeln
3460 Wilshire Blvd.
Los Angeles, CA 90010
(213) 387-2100

Midwest/Texas

Jeff Edman, Louise Graef
The Patti Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646
(312) 679-1100

New England

Merrie Lynch, Nancy Wood
CEL Associates, Inc.
61 Adams St.
Braintree, MA 02184
(617) 848-9306

New York/New Jersey

Linda Holbrook
160 State St.
Boston, MA 02109
(617) 367-7190

New York City/Mid-Atlantic

Ken Lipka
One Park Ave.
New York, NY 10016
(212) 503-5029

Southeast

Mark Browning
P.O. Box 81306
2511 Carroll Ave.
Atlanta, GA 30366
(404) 455-3430

Canada

Frank Lederer
The Patti Group
501 Eglinton Ave. E.
Suite 202
Toronto, Ontario M4P 1N4
(416) 482-6288

ATTENTION: AUTHORS

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

WHERE TO SEND IT

All editorial material, including article submissions, press releases, and products for evaluation should be sent to:

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to advertising, including ad copy, questions on billing, and requests for rates, should be sent to:

Advertising Department
Creative Computing
Ziff-Davis Publishing Co.
One Park Ave.
New York, NY 10016

Correspondence regarding subscriptions, including orders, changes of address, and problems should be sent to:

Creative Computing
P.O. Box 5214
Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

SUBSCRIPTIONS

All subscription orders and other correspondence related to subscriptions should be addressed to:

Creative Computing
P.O. Box 5214
Boulder, Colorado 80321

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S.	Canada	Foreign
1 year \$24.97	1 year 29.97	1 year 34.97
2 years 43.97	2 years 53.97	2 years 63.97
3 years 57.97	3 years 72.97	3 years 87.97

Airmail delivery on foreign subscription is available for a one-year period only at \$75.00 additional for mail to Asia and Australia, and \$50.00 additional for all other foreign.

Subscribers in the United Kingdom may send payment in sterling to:

Hazel Gordon
10 Bishops Way
Sutton Coldfield
West Midlands B74 4XU

Please allow at least eight weeks for change of address. Include old address as well as new—enclosing if possible an address label from a recent issue.

Now your IBM PC and AT can read

The OMNI-READER
is a revolutionary new Text Reader or Optical Character Reader.
It reads a fraction of the price of your computer system. It reads the printed word and translates it into the most popular visual language of today's personal and desktop computers and word processors. The need for slow and tedious retyping of already printed data is eliminated.

The OMNI-READER can jump from the OMNI-READER into your access computer system and onto the screen with as little effort as it takes to read "The quick brown fox."

The OMNI-READER

The OMNI-READER is a revolutionary new Text Reader or Optical Character Reader (OCR).

It reads a fraction of the price of your computer system. It reads the printed word and translates it into the most popular visual language of today's personal and desktop computers and word processors. The need for slow and tedious retyping of already printed data is eliminated.

The quick brown fox can jump from the OMNI-READER into your access computer system and onto the screen with as little effort as it takes to read "The quick brown fox."

1000 2000 3000 4000 5000 6000 7000 8000 9000 10000



OBERON
INTERNATIONAL
CIRCLE 137 ON READER SERVICE CARD

INPUT/OUTPUT

Mega Misunderstanding

Dear Editor:

American Planning Corporation thanks *Creative Computing* for granting us space to respond to the October '84 "IBM Images" column.

MegaBasic is aimed at the top 20% of Basic programmers and the manual is written for them. Before MegaBasic, advanced Basic programmers were largely ignored. These programmers require highly technically-oriented, detailed manuals. Many programmers commented that the MegaBasic manual is superior to the IBM Basic manual. The reviewer's request for more than the 298 existing examples is negated because she failed to use the examples already in the manual, e.g., how to list a program to the printer.

Ms. Glinert-Cole misses a fundamental point of MegaBasic—it is transportable across many existing machines and operating systems, and has proven to be immediately usable on new machines, e.g., IBM PC AT. Many Basics are not transportable.

There is no Basic on the market today that has a transportable screen editor. The MegaBasic editor works identically on every terminal, even ones that do not have function keys.

MegaBasic has a context editor. It is easy to examine every READ statement or reference to array X, which is important when editing programs longer than one screen. The non-mnemonic group of editing control characters was determined by transportability requirements. APC includes a program for reconfiguring the keyboard to the programmer's personal preference. The reviewer's comments that the editor does not perform as described are not true.

Ms. Glinert-Cole states she was "irritated by the half-hearted attempt of MegaBasic to do syntax checking." MegaBasic does not do any syntax checking because statements that are currently incorrect can become correct as procedures are defined. Dynamic syntax checking restricts top basic programmers' flexibility.

The index contains two entries and there are ten LIST command examples including: LIST #1, List the entire program on the printer. APC can only conclude that the reviewer did not use the 2000+ entry index and did not read the examples when trying to print a program.

The reviewer's benchmark program ran incorrectly because its syntax was incorrect. The manual states: "To form a compound statement from several individual statements surround them with []." This again appears to be a case of the reviewer not using the index or reading the manual or examples.

MegaBasic's excellent program development environment is not discussed. Programmers can enter, edit, execute, and debug multiple co-resident programs interactively, greatly speeding up program development. MegaBasic supports modifying code during execution and direct execution of any statement. There is no interpreter/compiler incompatibility as in Microsoft Basic.

There are 12 tracing commands. A programmer can dynamically select, based on a complex logical condition, which lines to single-step trace. During APC's first week after implementing the trace, internal programmer productivity increased 25%.

Another omission is that MegaBasic supports networks and controls buffering and record locking. MegaBasic has a 30-day money back guarantee. MegaBasic can easily take snapshots of the IBM screen and provide

windows in customer programs.

The correct time for the MegaBasic benchmark is 2.8 seconds or 650% faster than reported. That time ranks MegaBasic first, not last, in speed.

MegaBasic now has 32-bit integers; device driver support; automatic record locking; 25% speed improvement; arrays with 65K elements; 2 billion byte files; 127 open files; PC AT support; updated index; and 461-page manual.

John E. Cleckner

American Planning Corporation
4600 Duke St., Ste. 423
Alexandria, VA 22304

Lumena Correction

Dear Editor:

We at Time Arts Inc. were excited about your review of *Lumena* on the Mindset (February 1985). We would like to give you our correct phone number, however: 707-576-7286.

Frances Corman

Technical Writer

Time Arts Inc.

3436 Mendocino Ave.
Santa Rosa, CA 95401

NOTICES

Tax Corrections

In our March round up of tax preparation packages, we inadvertently scrambled some of the information concerning Management Control Systems' *Quick-Look Tax Planner*. The corrected information appears below.

Version 84.01 of the *Quick-Look Tax Planner* runs on the IBM System/34, System/36, System/23, PC XT and PC AT. On the System/34 and System/36, it sells for \$535; on the System/23, it sells for \$495; and on the PC XT and PC AT, it sells for \$350.

The correct address for Management Control Systems is:

2400 Lake Park Dr.
P.O. Box 723597
Atlanta, GA 30339
(400) 432-1996

In addition, the manufacturer of *Forecast* is not G&G Software, Inc., as we reported, but Monogram, located at

8295 S. La Cienega Boulevard, Inglewood, CA 90301, (213) 215-0355. IBM versions of *Dollars and Sense*, a personal financial management program, include *Forecast* for \$179.95 and do not require DOS, but do require p-System, Pascal.

Free Software for Educators

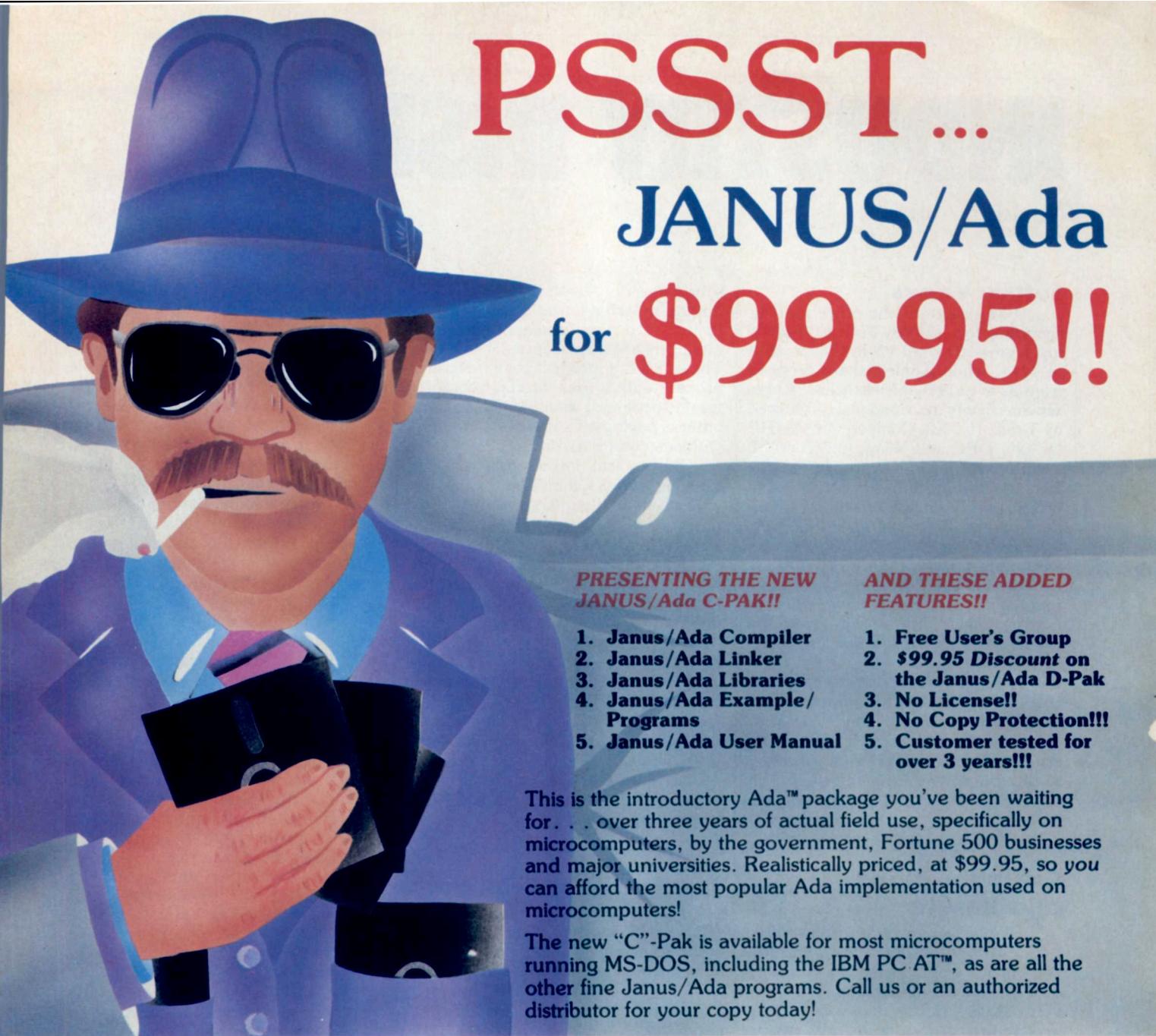
Weekly Reader Family Software, a division of Xerox Education Publications, has announced a special promotion for educators. The incentive program offers teachers a free software package of their choice with the purchase of any two Weekly Reader Family Software programs. The promotion will run through June 30, 1985.

The procedure is simple. Teachers bring an offer form (found in Weekly Reader teacher editions) to a local software retailer, purchase two Weekly Reader Family Software programs, and then mail in the coupon portion with proof of purchase. Weekly Reader Family Software will send the free software programs directly to the teacher. ■

PSSST...

JANUS/Ada

for \$99.95!!



PRESENTING THE NEW JANUS/Ada C-PAK!!

1. Janus/Ada Compiler
2. Janus/Ada Linker
3. Janus/Ada Libraries
4. Janus/Ada Example/Programs
5. Janus/Ada User Manual

AND THESE ADDED FEATURES!!

1. Free User's Group
2. \$99.95 Discount on the Janus/Ada D-Pak
3. No License!!
4. No Copy Protection!!!
5. Customer tested for over 3 years!!!

This is the introductory Ada™ package you've been waiting for... over three years of actual field use, specifically on microcomputers, by the government, Fortune 500 businesses and major universities. Realistically priced, at \$99.95, so you can afford the most popular Ada implementation used on microcomputers!

The new "C"-Pak is available for most microcomputers running MS-DOS, including the IBM PC AT™, as are all the other fine Janus/Ada programs. Call us or an authorized distributor for your copy today!

National Distributors

Westico, Inc.
25 Van Zant St.
Norwalk, CT 06855
(203) 853-6880

ASH II
7407 Marisol
Houston, TX 77083
(713) 933-1828

A.O.K. Computers
816 Easley St., Suite 615
Silver Springs, MD 20910
(301) 588-8446

Trinity Solutions
5340 Thornwood Dr., Suite 102
San Jose, CA 95123
(408) 226-0170

MicroProgramming, Inc.
P.O. Box 3356
Chatsworth, CA 91313
(818) 993-6475

International Distributors

Ada Australia
218 Lutwyche Rd.
Windsor 4030
QLD. Australia
(07) 57 9997

Progesco
155, rue du Faubourg
St. -Denis
75010 Paris
France
(1) 205.39. 47

Lifeboat, Inc. Japan
3-6, Kando-Nishikicho
Chiyoda-ku
Tokyo 101, JAPAN
03-293-4711

CP/M, CP/M-86, CCP/M-86 are trademarks of Digital Research, Inc.
*ADA is a trademark of the U.S. Department of Defense
MS-DOS is a trademark of Microsoft

©Copyright 1984 RR Software



SOFTWARE, INC.

P.O. Box 1512 Madison, Wisconsin 53701
(608) 244-6436 TELEX 4998168
CIRCLE 135 ON READER SERVICE CARD

specialists in state of the art programming

INDUSTRY INSIDER

David H. Ahl

Future Views

IBM's share of the office market, according to a study by Future Computing, increased from 18% in 1982 to 41% in 1984, while Apple's share dropped from 22% to 11%. Nevertheless, Apple remains firmly in second place, followed by Tandy (6.3%), Compaq (4.5%), HP (3.9%), DEC and Wang (3.7% each), Zenith (3.2%), and Kaypro (1.7%) . . . The Electronics Industry Association projects home computer sales of 6 million units in 1985 and 75 million software packages (86% on floppy disk and 14% on cartridge) . . . A research study by Business Communications indicates that the market for artificial intelligence hardware and software will grow at a rate of 50% a year for the rest of the decade.

In 1984, U.S. exports of computers to China doubled to \$101 million and are expected to double again in 1985. However, this increase hardly makes up for the 2.1 million tons of grain (worth about \$288 million) the Chinese reneged on buying. Overall, the U.S. had a \$60.5 million trade deficit with China in 1984.

Company Plans and Results

Digital Equipment Corp. has halted production of its Rainbow personal computer; it plans to sell off an estimated 10,000 machines in inventory. Angering many dealers, DEC said it would not accept returns from dealers who opt to drop the line because, said the company, the production halt is "a temporary measure" and it is "not abandoning the product." Industry observers, customers, and dealers have expressed skepticism at that statement, suggesting that the move is an attempt to ease out of the market gracefully.

Shugart, one of the oldest floppy disk drive manufacturers, was acquired by Xerox for \$41 million in 1977. However, Shugart missed the IBM PC bandwagon, and the company's 5 1/4" manufacturing operations are being sold to Matsushita, a Japanese giant known in the U.S. for its Panasonic and Technics labels. A spokesman said the other operations would be sold if possible, but it was more likely that they would just be

shut down . . . Lotus has invested \$1 million in Arity Corp., a ten-man firm looking into ways of adapting artificial intelligence to microcomputer software. The firm's first product is an integrated package with a user interface designed for inexperienced users . . . Eagle Computer is paying off some of its creditors with new common stock.

Profits and losses: 1984 sales at Compaq were \$329 million and income was \$12.8 million, both nearly three times the 1983 figures . . . 1984 sales at Lotus also tripled to \$157 million, while earnings increased 250% to \$36 million . . . Vector Graphic, a shadow of its former self, posted 1984 losses of \$3.6 million on sales of \$3.4 million . . . In the second six months of '84, Commodore sales dropped from \$112 million a year earlier to \$89 million; net loss was \$5.3 million . . . Software Publishing Corp., publishers of the pfs: line of software reported a doubling of sales and a profit increase of 114% in the fourth quarter . . . HP's quarterly net declined 56% on \$1.53 billion of sales, a 20% increase from a year earlier.

Random Bits

Remember when we reported that IBM was buying quantities of MSX systems? Apparently the reason is that Big Blue is developing an MSX machine of their own. It is to have two built-in disk drives and an interface to a laser disc unit (from Sony); target retail price is \$300 . . . We also note that IBM is selling a PCjr in Japan with 3 1/2" disk drives; it is not currently slated for the U.S. market.

Steve Wozniak, co-founder of Apple Computer, has left the company to pursue interests in the video entertainment industry. Readers will recall that Woz was one of the organizers of the US Festival two years ago. Inside sources say that as Jobs and Sculley moved Apple more toward business markets, Woz felt ignored and unwanted.

Commodore has licensed the Perfect Software line (*Perfect Writer*, *Perfect Calc*, etc.) from Thorne EMI for its new C128 computer . . . Tallgrass Technologies is scrapping its current line of hard disk/tape drive units to make

way for its new PC/T line of disk/tape systems. The PC/T line uses a 60Mb cartridge tape system for backup . . . Harris Corp. has unveiled a local area network, HarrisNet, which can couple up to 250 IBM PCs or clones together into a cluster controller . . . Ashton-Tate has dropped the multi-user version of *dBase II* in the U.S., although it will continue to be sold in other countries where the reception is "warmer."

As price competition on hardware heats up, more dealers look to software for their profits. Ask a Businessland salesman for a simple spreadsheet and word processor and chances are he'll sell you *Lotus 1-2-3* and *WordStar* for over \$1000 rather than a couple of \$99 packages that would meet your needs just as well. We hear that some manufacturers of low-priced software plan to take action.

The Sesame Place theme park in Langhorne, PA has just announced a new computer program with various courses, one-week computer camps, and training for teachers. But to teach "the latest computer techniques" the Sesame Place folks chose TI 99/4A computers; I guess they got a good price . . . In a recent Dataquest survey among non-owners of computers, 57% said they didn't need one and 26% said prices were too high. Other reasons for non-ownership included: "Too complicated," "I'm old fashioned," and "I'm too busy."

A machine that has been getting rave reviews in England, the Amstrad CPC464, is set to make its debut in the U.S. market. The graphics are spectacular and the price is right (\$300-400), but I keep thinking, "Will this be a repeat of the Sinclair Spectrum?" . . . Another successful British computer, the Sinclair QL, has finally been scheduled for release in the U.S. in "early 1985." Price is set at \$499 . . . And while we're speaking of the U.K., it should be noted that Tandy entered into a \$10 million deal with ACT to convert its 49 existing Tandy Computer Centers to TA ComputerWorld stores. The stores will carry both Tandy and ACT products.

How's this for a real-time clock? A story in *The Wall Street Journal* (1/8/85) mentions that Kaypro "in November shipped an IBM-compatible computer than ran eight months late." ■

Net Worth scores "a bull's-eye" with critics and you!

"Until Your Personal Net Worth came into our lives, our budget was non-existent, and our financial planning was reminiscent of the Stone Age."

Betsy Byrne
Albuquerque, NM

"...this comprehensive package is much more than a method of adding up one's accumulated financial worth as its title might imply. It's an extremely flexible home-budgeting and accounting program, with a well-written manual that explains simple accounting principles for the uninitiated."

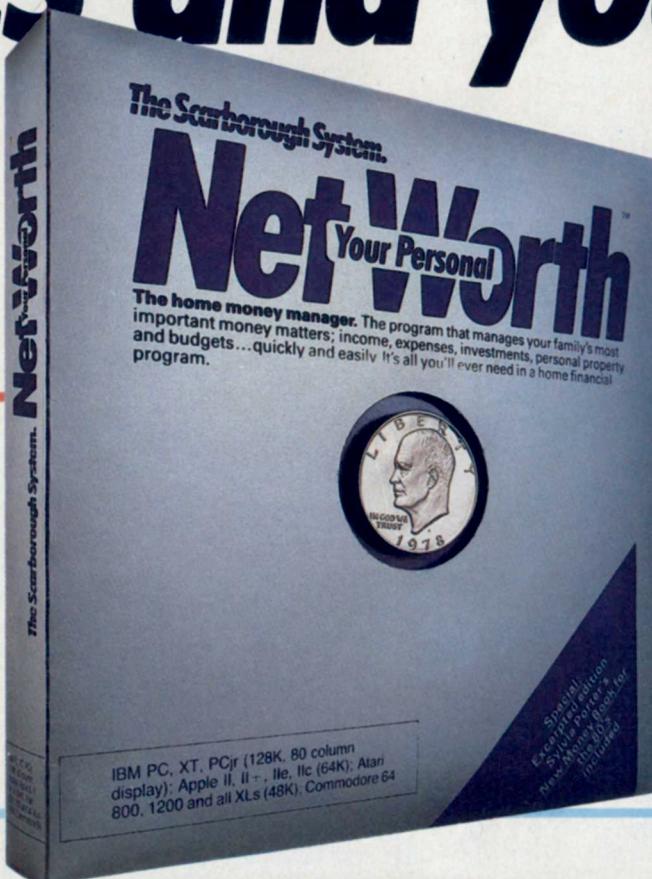
Family Computing

"Congratulations! Your Personal Net Worth is the best home budget program I have seen yet..."

Walter C. Repak
Bloomfield, NJ

"A program that is powerful and versatile, yet very easy to use..."

Tribune, San Diego



"Your Personal Net Worth, from Scarborough Systems, is easy to like, if not love. It's home accounting without tears... Best of all, the program's probably tax-deductible."

PC World

"First, let me congratulate you on an excellent program... yours is by far the most professional, fastest, and most comprehensive."

Ronald J. Misk
Beaverton, OR

"This program was written exclusively for individuals... It has scored a bull's eye by providing them with a helpful, flexible, easy-to-understand financial program that makes money management simple and fast."

PC Magazine

Try Your Personal Net Worth yourself and see how versatile and infinitely usable it is. It's only business is managing your home finances. No other program does it more quickly, more easily, more directly. You can even track your investments and household inventories. With more great features than programs selling at twice the price, Your Personal Net Worth is sure to score points with you too.

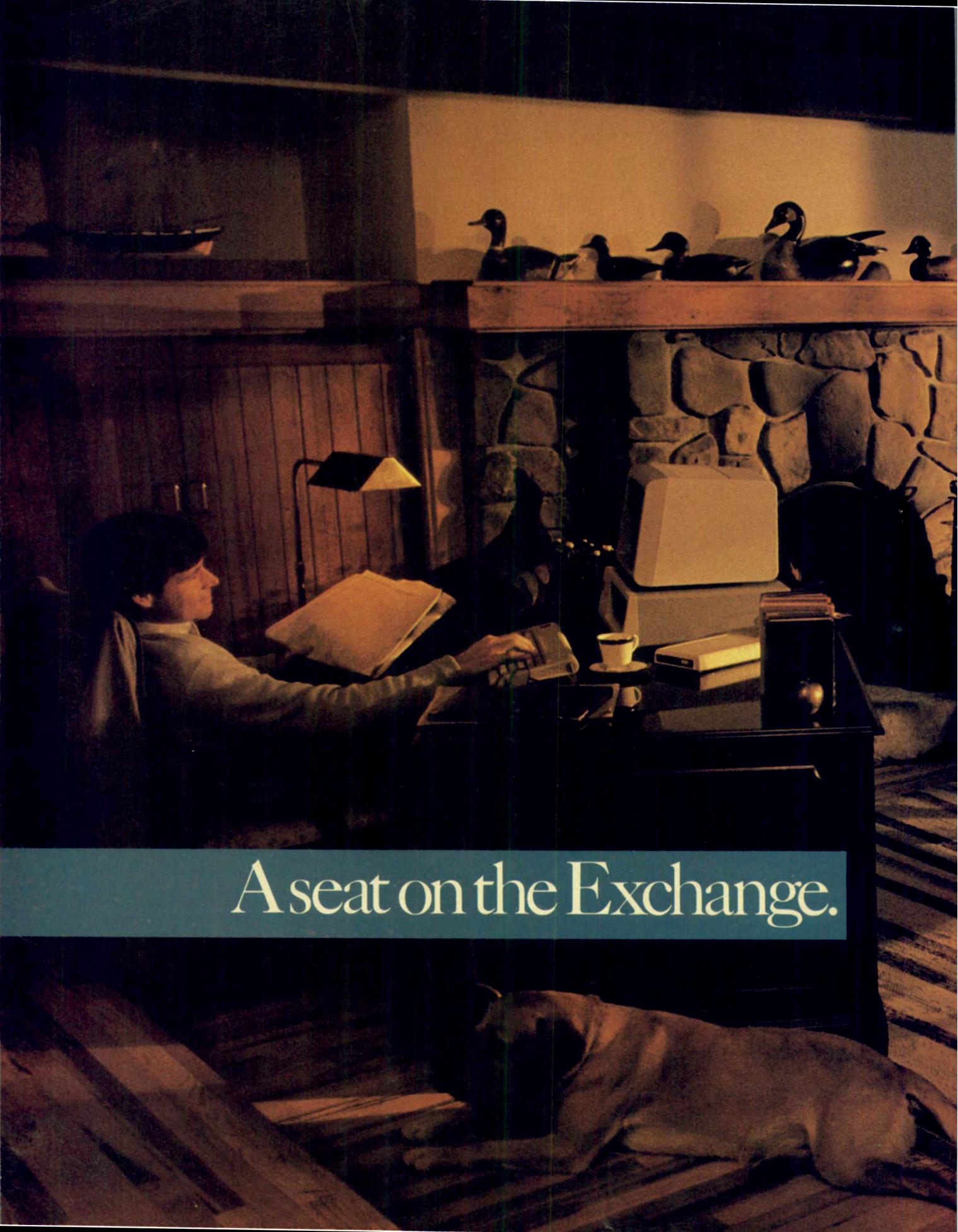
Available for:
IBM PC/XT/PCjr
Apple II+/IIe/IIc
Commodore 64/128
Atari (48K)

For the dealer nearest you, call 1-800-556-2283.

The Scarborough System.

© Scarborough Systems, Inc., 555 S. Broadway, Tarrytown, N.Y. 10591.

CIRCLE 123 ON READER SERVICE CARD



A seat on the Exchange.



Step beyond the limits of personal computing, and into the action on Wall Street. Or right through the doors of the world's finest stores. Browse, buy, sell or trade. Stocks, information, Maine lobster, airline tickets. Without leaving your chair.

With an Avatex™ modem, your personal computer can take you wherever you want to go, on your schedule. As far, as fast, as often as you like, at a price that won't stop you in your tracks.

Avatex gives you the power, speed and intelligence of a serious piece of communications equipment, streamlined so anyone can use it easily and productively. Immediately.

So with Avatex the possibilities are astronomical, but the price of owning one is not: Avatex 300—\$64.95,* Avatex 600—\$99.95,* Avatex 1200—\$299.95.*

For the name of the Avatex dealer nearest you, call 800-4-AVATEX.

Avatex™ Modems

The next step in personal computing.



Avatex™ is a trademark of E·E DataComm U.L./CSA & FCC Part 15 and 68 approved. Copyright 1985 by E·E DataComm *Suggested retail price

CIRCLE 111 ON READER SERVICE CARD

Computers and Engineering: A Winning Combination

Betsy Staples

The problem: Survey all the National Guard armories in the state of New Jersey and prepare specific recommendations for energy conservation and cost saving for each.

The solution: Lotus *Symphony*, an IBM PC, and lots of memory.

When William C. Baumann, a consulting engineer based in New Vernon, NJ, was awarded the contract by the State Department of Defense, he knew that he faced a mountain of data and hundreds of thousands of calculations. He also knew it was a perfect job for a computer.

Each of the State's 40 armories had to be surveyed by a person in the field using a checklist of 50 energy-related items. The data were then fed into the IBM PC where they formed the basis of the reports Baumann would ultimately give to the State.

The *Symphony* template was created by Baumann's son, Bill, whose experience with IBM and DEC minis stood him in good stead.

The database portion of the *Symphony* template includes tables containing prices of insulation, weatherstrip-

ping, storm windows, dampers, control valves, overall energy management systems, and other energy saving devices and materials. It also provides information needed to calculate the actual amount of energy to be saved in each building. "Without a computer to keep track of all this," says Baumann, "you would lose your mind."

The spreadsheet matrix is 16 x 4000, a situation that caused problems as the project progressed and memory began to run short. At the outset, they added 128K to their original 512K machine, but soon exhausted that and added another 256K to the motherboard and 512K of directly addressable memory with a plug-in ODM board from Mega-Omega Systems of Dallas, TX. Even that was to prove insufficient, and they ultimately had to trade up to a PC XT with a 10Mb hard disk.

Their original plan was to carry a Panasonic Sr. Partner to each building and enter the checklist data on site, but the matrix grew too large for the Panasonic, and they reverted to pencil and paper for the information gathering phase of the project.

Once the data have been entered, calculations can easily be done as many times as necessary to correct errors and investigate alternate plans. "In the past, it could take days to correct a single error, and we seldom had the luxury of saying 'What if...?' Now we can try different solutions until we find the one that is best for the owner of the property being surveyed. It's actually a pleasure to make changes."

When he is satisfied with the recommendations presented by the program, Baumann prints out the finished report using a template in the word processing section of *Symphony*. Here he hit another snag. Each of the reports is 60 to 80 pages long, and his faithful Epson MX-80 was simply too slow. So he added a Hewlett Packard Laser Printer to his hardware collection and found that printing time was reduced to one quarter of Epson speed. "Five years ago," he notes, "a human typist would have spent days typing and correcting just one report."

The finished report that he presents to the Department of Defense has four primary sections: specific recommenda-

Sample conversion table from database.

		H.W. I...	105
COST GAS	0	ONS PER PERSON	1.5
PRESENT BIN HOURS	67,293	NUMBER OF OCCUPANT	10
SETBACK BIN HOURS	0	DAYS USE PER YEAR	312
BOILER EFFICIENCY	0.68	# OF F&T TRAPS	7
NEW BOILER EFFICIENCY	0.7	# OF THERMO. TRAPS	58
SEASONAL BOILER EFFICIENCY	0.6	# DRILL HALL LITES	24
GROSS SQUARE FOOTAGE	15986	WATTS DRILL LITES	500
ROOF AREA 1	15986	DAILY HOURS DRILL	12
ROOF AREA 2	0	DAYS DRILL USE	24
ROOF AREA 3	0	# OF INCAN. LIGHTS	33
U VALUE ROOF 1	0.15	WATTS OF INCAN	150
U VALUE ROOF 2	0	DAILY USE INCAN	6
U VALUE ROOF 3	0	# OF EXT FLOODS	9
WALL AREA 1	0	WATTAGE FLOODS	150
WALL AREA 2	0	# OF BOILERS	1
U VALUE WALL 1	0	SHUT-OFF DAMPERS	1
U VALUE WALL 2	0	L.F. 3/4" PIPE	0
GLASS AREA 1	1801	L.F. 1" PIPE	0
U VALUE GLASS 1	1.1	L.F. 1 1/4" PIPE	0
NEW U VALUE OF ROOF 1	0.06	L.F. 1 1/2" PIPE	0
NEW U VALUE ROOF 2	0	L.F. 2" PIPE	0
NEW U VALUE ROOF 3	0	L.F. 2 1/2" PIPE	0
GALS OF FUEL COND./1000	0.5	L.F. 3" PIPE	0
BTU PER UNIT FOR DHW	11600	L.F. 4" PIPE	0
CFM CAULKING CRACK	0.43	L.F. 5" PIPE	0
L.F. CAULKING CRACK	1139	PERCENTAGE WIND	0.5
# OF RAD. VALVES	0	COST PER DAMPER	\$1,400
AREA OF ATTIC SPACE	0	# OF SKYLIGHTS	0
U VALUE OF ATTIC	0	U X A FOR ZONE	0
NEW U VALUE OF ATTIC	0	PRESENT HOURS	0
# OF BOILERS FOR TURBOS	0	NEW HOURS	0
AREA OF SKYLIGHTS	0	COST FOR ZONING	\$0
# OF OPTIMIZERS	1		

Sample summary from finished report.

Lust per Kw. Electricity	\$0.1310			
Cost of Fixture	\$130			
BTU per KWH Electricity	11600			
SAVINGS = Existing Wattage = # of Fixtures x Watts per Lamp				
New Wattage = # of Fixtures x Watts per Lamp				
Watts Saved per Hour				
1350	=	9	x	150
- 630	=	9	x	70
		720		
Watts Saved/Year = Watts/Hr. x Days Use x Hours Use/Day				
2628000	720	365	10	
KWH Saved per Year = Watts Saved / 2628000				
1000	1000			
Dollars Saved = KWH Saved x Cost per KWH				
\$344	2628			
Cost of Implementation = # of Fixtures x Cost per Fixture				
\$1,170	9			
1. SOURCES FOR CALCULATIONS:				
1. ENERGY MANAGEMENT, Ottaviano Technical Services, 1984				

tions (replace faulty steam traps, replace incandescent light fixtures, caulk window frames, etc.), details of the costs associated with each recommendation, the payback period on each recommendation, and a list of sources (engineering calculations, price lists, etc.) used in preparing the report. These topics are discussed in detail in the narrative section of the report and summarized in tabular form.

Is the system worth the time and money Baumann and his son put into it? "Definitely. The system has definitely paid for itself."

"The computer has cut our work by about 10 to 1, and by allowing us to investigate innumerable permutations, we can do a better job for the owner of the property," Baumann says. Ongoing government surveys of schools and other public buildings should ensure that Baumann's computer system remains productive for some time to come.

The Other Side of the Coin

Another computer system that allows Baumann to do a better job for his

clients is the *Carrier 2000Jr.* computer aided design package that also runs on his PC. In contrast to the *Symphony*-based system, the CAD system enables him to do a better job not by saving time but by allowing him to produce better quality drawings that can be changed easily and are less subject to error than drawings produced manually. "Frankly, I can do the drawings much faster by hand; it is the ability to make changes quickly and easily that makes the system worthwhile."

The package, which consists of a 512K IBM PC, an HP 7475A Plotter, a Bausch and Lomb DT-11 digitizer, two monitors—one monochrome and one color—and software supplied by the Carrier Corporation, is designed specifically for architects and engineers. The designer uses the digitizer to draw the individual systems of a building (lighting, cooling, heating, plumbing, etc.) in different colors. The various systems can then be superimposed on one another to provide a complete picture of the building.

Being able to see all of the systems

together makes it possible for the designer to spot conflicts before installation. Corrections can be made immediately, and a change made on one system or layer is automatically made in the appropriate place on all the others. "This makes installation in the field easier and cheaper."

Like *Symphony*, the Carrier package allows Baumann to experiment with different designs and choose the best one for his client.

His one criticism of the high tech industry that has changed his business so dramatically is that "it is virtually impossible for the average businessman to get the equipment to work without a great deal of help." Each time he added a new piece of hardware, work on the project would come to a halt while he and Bill tried to decipher the documentation and figure out why things didn't work as they were supposed to.

"I know that people who set up their own computer systems five years ago had a really hard time," Baumann says, "but it really shouldn't be that way today."

Sams Books Put High Tech On the Level Your Level.

Whether you're an engineering student learning about microwave technology, a seasoned engineer in search of the right semiconductor, a businessman breaking into the security market or a novice trying to get a grip on his first computer, Sams has the book for you.

A leading publisher of technical books since 1946, Sams has over 350 titles covering the use of today's most popular computers, general programming and applications, robotics, security, electronic design, audio and communications and more.

And each month, Sams adds new releases like **The Best Book of: Symphony** (22420), **Discovering Ms-Dos** (22407), **Data Communications, Networks and Systems** (22235) and **Image Tubes** (22023).



So whether you're looking for high tech or new tech . . . whether you're a beginner or a master . . . Sams has the book for you.

Sams books are available at your local bookstore or call Operator 112 at 317-298-5566 or 800-428-SAMS.

Howard W. Sams & Co., Inc., 4300 W. 62nd St., P.O. Box 7092, Indianapolis, IN 46206

CIRCLE 139 ON READER SERVICE CARD

Modem

In the squat ivory tower that houses our editorial offices, telecommunications is one of the hottest topics around. Our survey in the February issue indicates that it is popular among readers as well. The increased sales of hardware and software products, coupled with a proliferation of on-line services, reflects this trend. All across the market, from the low end to the upscale, people are discovering the ease, speed, and convenience of telecommunications.

The key to unlocking this long distance power is a modem, a device that allows computers to communicate with one another over common telephone lines. It translates the digital signals of your computer into the analog signals recognized by the telephone system. A modem at the other end of the line converts the analog signals back into digital form.

This process is called modulation-demodulation, and the modem derives its name from what it is: *modulator-demodulator*.

Modems generally use either synchronous or asynchronous communication. Synchronous modems organize data into blocks and transmit all the blocks at one time. Asynchronous modems send data in a long stream, one character at a time. The vast majority of modems for microcomputers are asynchronous.

Long Distance Chaos

A computer creates digital signals by using bursts of voltage, representing on and off (1 and 0). These binary electrical signals must be precise; any deviation causes errors in the data.

On the other hand, the telephone system transmits analog signals, which

carry information over the lines using fluctuating electrical voltage that reacts to changes in sound pressure. The louder you talk into a telephone, the higher the voltage in the line.

Both types of signal run into problems during long distance transmission. The longer the distance between communication points, the weaker and more distorted the signal. Eventually, both digital and analog signals fade into unrecognizable static.

The telephone company solves the problem by using special analog filters and amplifiers that select and boost a limited bandwidth of comprehensible voice communication frequencies. Signals outside this range of 300 Hz to 3300 Hz are discarded.

Unmodulated digital signals receive a hostile welcome from the telephone lines. The filtering and amplifying blur the precise signals. General line noise mimics digital pulses and produces echoes. If a signal falls outside the 300 to 3300 Hz range, it is discarded. All this adds up to distorted transmissions.

To avoid these problems, a modem changes digital signals into audio tones and transmits these tones over specific frequencies. And just as different voltage bursts in a computer represent on and off (1 and 0), so the modem uses different audio frequencies to duplicate on and off patterns.

Since telecommunication is usually two-way, a modem uses two sets of tones to distinguish the data it transmits from the data it receives. Furthermore, to coordinate the tone frequencies, one modem acts as a signal originator and the other acts as a signal answerer.

Figure 1 shows the frequencies used by the most common type of modem (AT&T Bell 103 standard). The technical term for this modulation-demodulation technique is Frequency Shift Keying. The signal originator transmits at one pair of frequencies, which is the exact pair of frequencies the signal answerer expects to receive. Notice that when the signal answerer sends data to the originator, the two sets of transmitting and receiving frequencies also match.

The proper term for simultaneous, two-way data transmission is full-duplex. As you may have guessed, one-way data transmission is called half-duplex. Just about all Bell 103 standard modems are full-duplex.

Greased Lightning

The data you send over a telephone line uses a code called ASCII, short for American Standards Code for Information Interchange. Each transmitted character (letter, number, punctuation, or symbol) is made up of seven bits, has two more framing bits to tell each computer when the bit pattern for a character starts and stops, and may include one or two parity bits for error checking. All told, a single character can be up to 11 bits long.

The speed of a modem is measured in bits per second, more commonly referred to as baud. Actually, baud is something of a misnomer, referring to the number of times a modem signals another modem. At first, bits per second

Magic

More baud for the buck:
A buyer's guide to understanding,
choosing, and using modems
by Russ Lockwood

be used for half-duplex telephone communication. In this case, the parties must take turns sending data at 1200 baud.

Modem Wars

The breakthrough came in late 1972, when Racal-Vadic introduced the VA3400, a full-duplex 1200 baud modem. The VA3400 uses Quadrature Amplitude Modulation, one variation of a technique called Phase Shift Keying, to make the digital-analog signal conversion. As before, one modem functions as the signal originator while the other is the signal answerer.

The signal originator transmits a constant signal at 2250 Hz, and the signal answerer transmits a constant signal at 1150 Hz. Instead of changing frequencies as in Frequency Shift Keying, Quadrature Amplitude Modulation keeps a constant frequency but changes the starting point of the analog sound waves. The modem sends out an electronic marker and regularly checks to see where that marker is in relation to the incoming waves from the other modem. The "Quad" refers to the four positions at which the modem detects the marker—the top of the wave, the bottom of the wave, midway between the top and bottom on the "up" side, and midway between the top and bottom of the "down" side. Each position actually represents two bits (called dibits) of information.

AT&T Strikes Back

In 1976, AT&T introduced its own full-duplex 1200 baud modem, the Bell 212A standard. This modem uses a variation of Phase Shift Keying technique, called Four Phase Differential Phase Shift Keying, which is completely in-

compatible with Quadrature Amplitude Modulation. The signal originator transmits at 1200 Hz, and the signal answerer transmits at 2400 Hz, roughly the opposite of the VA3400 from Racal-Vadic.

Most 1200 baud modems use the Bell 212A standard, just as most 300 baud modems use the Bell 103 standard. The VA3400 and Bell 202 protocols are not extinct. Indeed, many information services offer VA3400 compatibility. However, Bell 212A is significantly more popular than either of them.

The rest of the world does not recognize the Bell 212A standard. Instead, by treaty, other countries have settled on an incompatible standard called V.22 put forth by the Consultive Committee on International Telephone and Telegraph (CCITT). It uses a different modulation technique operating on different frequencies.

Return of the Innovator

At this time, 11 companies—Racal-Vadic, US Robotics, Hayes Microcomputer Products, Multi-Tech Systems, Novation, Micom, Penril DataComm, Case Rixon, Gandalf Data, Concord Data Systems, and Cermetek Microelectronics—have introduced 2400 baud modems, and others are soon to follow. AT&T also introduced a 2400 baud modem, but the Bell 2224 protocol has yet to catch the fancy of the industry.

Predicting which protocol will succeed as the 2400-baud industry standard is difficult to do. Essentially, manufacturers are cramming 2400 bits where 1200 bits used to be using a variation of Phase Shift Keying. There seems to be some consensus in using adaptive equalizing techniques to preserve signal quality and prevent errors, but that is not a transmission technique.

CCITT already has specifications for 2400 baud modems: V.22bis. Only time will tell whether it becomes a North American standard, but most of the manufacturers are offering CCITT compatibility with their 2400 baud modems.

and baud could be used interchangeably, but with advances in technology, differences have appeared. Nevertheless, baud remains a popular, if slightly improper, term for transmission speed.

Back in the days of the Teletype machine, transmission speed was a hair-raising 110 baud, roughly 10 or 11 characters per second. The Bell 103 standard mentioned above transmits at a maximum of 300 baud, or roughly 30 characters per second.

Transmission speeds faster than 300 baud are possible using the Frequency Shift Keying modulation technique. However, full two-way communication places some of the rapidly shifting frequencies outside the limited bandwidth of 300 Hz to 3300 Hz. As mentioned above, signals outside this range are discarded.

To meet the need for higher speed, AT&T introduced the Bell 202 standard. While technically a full-duplex modem, it allows 1200 baud transmissions in only one direction. The return channel is only five baud, which is practically useless for transferring long files. Although cumbersome, a Bell 202 standard modem can

Figure 1.

AT&T Bell 103 Standard
Full duplex, 300 baud
Frequency Shift
Keying Modulation

		Transmit	Receive
Signal Originator	On (1)	1270Hz	2225Hz
Signal Originator	Off (0)	1070Hz	2025Hz
Signal Answerer	On (1)	2225Hz	1270Hz
Signal Answerer	Off (0)	2025Hz	1070Hz

Glossary

Acoustic coupler: A primitive type of modem with rubber cups to cradle the handset of a telephone.

Analog signals: The tones carried over telephone lines.

ASCII: The standard code used to represent letters, numbers, and symbols as bit patterns.

Asynchronous: Sending data in series, one bit at a time.

Baud: A common term applied to transmission speed. In most cases, baud is nearly the same as bits per second.

BBS: Bulletin Board Systems. Electronic meeting places usually operated by individuals using their home systems.

Bell 103: The AT&T standard full-duplex 300 bps modem.

Bell 212A: The AT&T standard full-duplex 1200 bps modem.

Bps: Bits per second, the speed at which data are transmitted.

C line: A better-than-average phone line leased for private use. These are graded C-1, C-2, etc.

DB-25: The standard connector between an external modem and a computer.

Direct connect: This design allows a modular telephone cord to plug directly into a modem.

Downloading: Receiving information electronically and saving it to disk.

Full Duplex: The simultaneous transmission of data in two directions.

Half duplex: The transmission of data in one direction.

Leased line: A private line leased exclusively by one customer.

Log-on: The process of accessing a telecommunications service.

Modem: Contraction of modulation/demodulation, the process of converting digital signals into analog signals and back again.

RS-232C: The standard serial interface for telecommunications.

Synchronous: Transmitting data in blocks.

Uploading: Sending information electronically and storing it at a remote site.

3002: The standard grade leased line.

Several manufacturers offer modems with speeds of 9600 baud and beyond. Some of them use Phase Amplitude Modulation, another version of Phase Shift Keying. Note that these high-speed modems are usually reserved for mainframe communications. In any event, one of these superfast modems can cost more than your entire computer system.

A Port of Call

Back in 1969, the Electronics Industry Association adopted RS-232 as a standard for serial communication between data terminal equipment (your computer) and data communication equipment (the modem). RS-232C stands for Recommended Standard 232 Version C and is indeed the industry standard port for telecommunications.

Among other things, RS-232C calls for a 25-pin connection between modem and computer and specifies which signal each pin carries. Thus, pin 1 is a ground, pin 2 transmits data, pin 3 receives data, and so on.

The more-or-less standard connector to the RS-232C port is called DB-25. It derives its name, in part, because it is shaped like the letter D. Most, but not all, computers and modems use a female DB-25 connector, which means the intervening cable requires male DB-25 connectors at each end. However, the IBM PC communications card, for example, has a male DB-25 connector, which means you need a female connector on one end of the modem cable and a male connector at the other.

Note that many modems do not send signals through all 25 pins. Ignoring a few pins is perfectly acceptable. A manufacturer is said to support RS-232C as long as the signals do not directly violate it. Many modems will function using only pin 2 (transmit data), pin 3 (receive data), and pin 7 (signal ground).

Finally, the modem must be connected to the telephone system—a task often accomplished by plugging the line from the modular phone jack on the wall into the modem. Although this should go without saying, in more than a few cases, novice telecommunicators have neglected to perform this step, producing far from satisfactory results.

A Fist Full of Features

Now that you understand the fundamentals of how modems operate, what features should you look for? Choosing a modem takes as much time

and effort as choosing a printer or monitor—certainly the costs are roughly the same. As always, your decision should reflect your needs. It should meet your current requirements and allow for future growth. Contrary to marketing claims, many people just do not need the fastest, fanciest, and costliest modem around.

Speed

Basically, you can choose from 300 baud, 1200 baud, and 2400 baud modems. Quite often, the higher speed modem also includes the electronic circuitry for the lower speeds. Thus, one of the most popular combinations around is a 1200/300 baud modem.

A 1200 baud modem is four times as fast as a 300 baud modem. Likewise, a 2400 baud modem is twice as fast as a 1200 baud modem. To give you an idea of the difference in transmission time, a 10,000-word data file should take approximately three minutes to send at 2400 baud, a little over six minutes at 1200 baud, and an agonizing 24.5 minutes at 300 baud. Clearly, if you routinely transmit and receive long files, and the business axiom "time is money" applies, the higher speed is desirable.

On the other hand, a 2400 baud modem for accessing a consumer telecommunications service represents overkill. If you are using the Source to "chat" or CompuServe to play games, a 300 baud modem works just fine. Most people do not type 30 characters a second, and waiting around for the mainframe to execute your command does not take advantage of that super speed.

Note that most telecommunications services charge extra for using faster speeds, and many do not support 2400 baud transmission. Also note that many networks (Tymnet, Uninet, MCI, et al.) are not capable of 2400 baud communication. This is probably a short-term problem though.

Also remember that you need modems of equal speed at both ends of the line. A 1200 baud modem cannot directly connect with a 300 baud modem at 1200 baud—it needs to go down to 300 baud. Likewise, you need compatible modems at each end. Buying a VA3400 modem will not let you directly connect with a Bell 212A standard modem.

Type

Modems come in two types: acoustic and direct connect. Acoustic modems were first on the market, in part because AT&T held a monopoly on direct con-

nnection into the telephone system. The handset of the phone fits snugly in the two rubber cups of an acoustic modem: one holds a speaker to generate tones and the other holds a microphone to receive tones sent by the modem at the other end of the line.

Direct connect modems bypass the telephone entirely. You plug the line from the modular jack on the wall directly into the modem.

Direct connect modems are by far the more reliable. Acoustic modems are notorious for picking up external noise that results in transmission errors. Many of the handsets on newer telephones do not fit in the cups, which increases the risk of errors. While direct connect modems are generally more expensive than acoustic modems, the improved signal quality is worth the extra cost.

However, older houses may not

have the modular plugs needed by direct-connect modems, so unless you want the phone company to install a new jack (or you do it yourself), an acoustic modem is your only choice.

Many direct-connect modems provide a second jack on the modem itself to hook up the telephone. You can use either the modem or the telephone; this handy arrangement relieves you of the chore of plugging and unplugging the

Who Ya Gonna Call?

The more popular telecommunications services include:

American People Link
Arlington Ridge Office Center
3215 N. Frontage Rd.
Arlington Heights, IL 60004
(312) 870-5200
(800) 524-0100

This newcomer to the telecommunications service market offers electronic mail, partyline, special interest groups, and a section to find subscribers with similar interests. It does not have the variety of CompuServe or The Source, but at roughly half the cost, it is especially affordable.

Bibliographic Retrieval Service
1200 Route 7
Latham, NY 12110
(518) 783-1161

Industry leader supplies a host of databases covering just about every topic you can think of, from business management to psychology to family planning. It offers expensive daytime service for businesses and a smaller, less expensive evening service for the home.

CompuServe Information Services
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, OH 43220
(800) 848-8199
(614) 457-0802

The largest full-service telecommunications service around provides a multitude of information, education, and entertainment services. Electronic mail, CB simulator, and special interest groups (like the Creative Computing SIG at PCS-22) make this a good overall choice.

Delphi
General Videotext Corp.
3 Blackstone St.
Cambridge, MA 02139
(800) 544-4005
(617) 491-3393

A relative newcomer into the telecommunications field, the service is a smaller version of CompuServe and The Source, with information, education, and entertainment services. Electronic mail is sophisticated and allows you to send messages to CompuServe and Source subscribers.

Dialog Information Services
3460 Hillview Ave.
Palo Alto, CA 94304
(800) 227-1927
(800) 982-5838
(415) 858-3785

Established in the 1960s by Lockheed, this service offers over 200 databases covering all sorts of topics, especially those concerned with business and the sciences. The service is so sophisticated, it offers on-site training.

Information Access Company
11 Davis Dr.
Belmont, CA 94002
(800) 227-8431
(415) 591-2333

This service offers full-text electronic versions of your favorite magazines, including *Time*, *People*, *Life*, *Fortune*, *Sports Illustrated*, foreign journals, and Ziff-Davis publications such as *A+*, *PC*, and *Creative Computing*.

ITT Dialcom
1109 Spring St.
Silver Spring, MD 20910
(301) 588-1572
Worldwide electronic mail system.

MCI Mail
P.O. Box 1011
1900 M St. NW
Washington, DC 20036
(800) 424-6677
(202) 833-8484

Electronic mail service offers instant delivery to other subscribers. It also can send (paper) letters to non-subscribers within four hours, guaranteed overnight, or within a day or two.

NewsNet Inc.
945 Haverford Rd.
Bryn Mawr, PA 19010
(800) 345-1301
(215) 527-8030

Just as Information Access Company provides full-text electronic versions of magazines, so NewsNet provides full-text electronic versions of newsletters, with an emphasis on business topics.

PlayNet
200 Jordan Rd.
Troy, NY 12180
(518) 273-0443

PlayNet has just opened the lines to its home telecommunications service. It offers electronic mail, Talk, and a variety of simple games. The big draw is use of the graphics of your computer to play the games. Available for the Commodore 64, with versions for the Apple and IBM computers coming soon.

The Source Information Network
1616 Anderson Rd.
McLean, VA 22102
(800) 336-3366
(703) 821-6666

Another full-service telecommunications service to rival CompuServe. It charges more, but includes a slightly easier command structure. Electronic mail, entertainment, education, and stock quotes are among the services.

Three more firsts from the people who invented the wheel.



XEROX

From day one, Xerox and Diablo have been known as the two best names in daisywheel printers. And now there are three more in the Xerox line to choose from.

The Xerox Advantage D-25 Diablo printer turns out letter quality documents quickly and quietly. And it does all that for the price of a dot matrix printer.

At 80

c.p.s., the D-80IF is the fastest daisywheel printer ever made by Xerox. It has a built-in double bin sheet feeder. As well as the capacity to handle up to 16 computers at once.

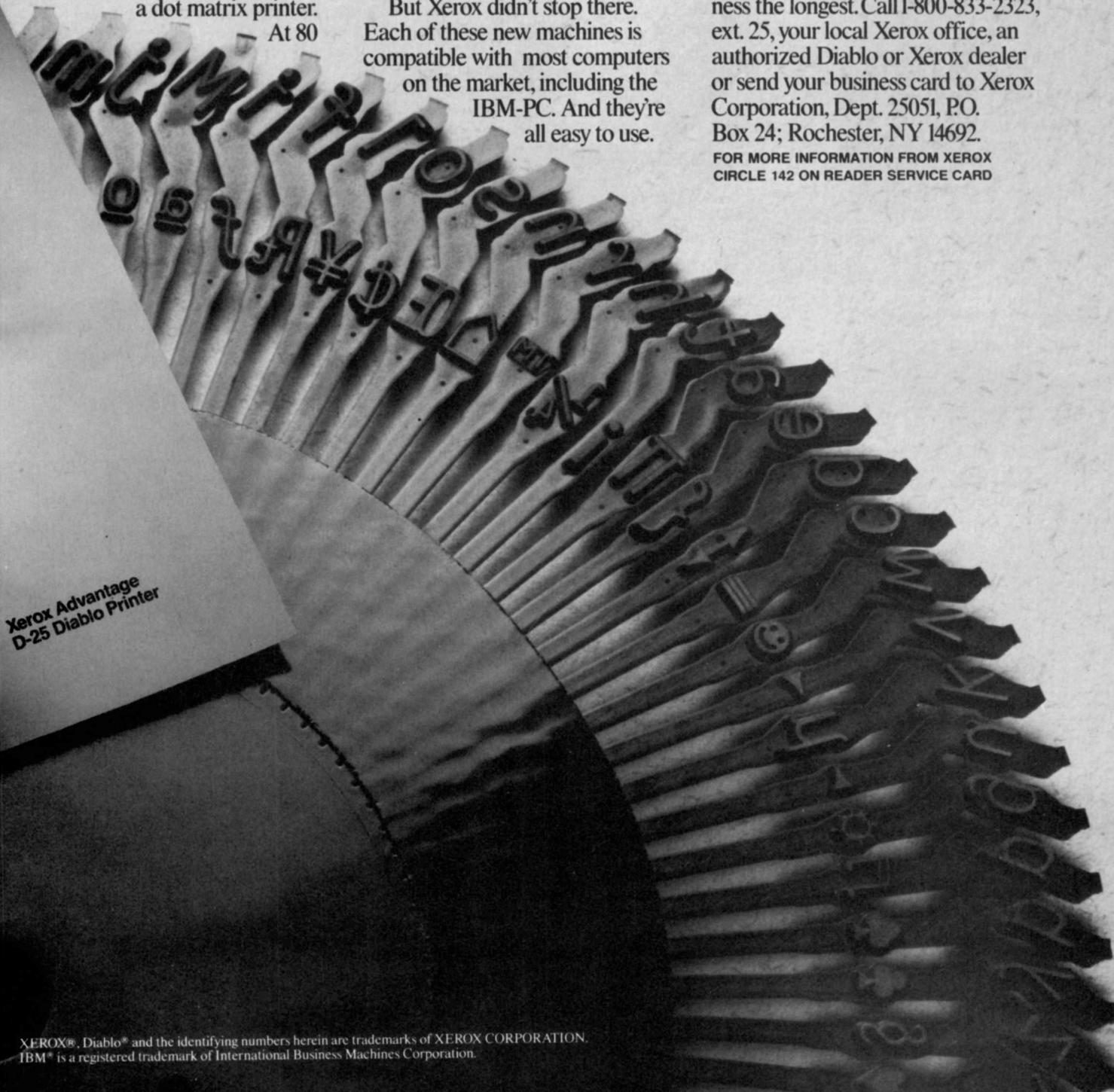
And the D-36 spells reliability. It averages 4,000 hours of printing between maintenance calls.

But Xerox didn't stop there. Each of these new machines is compatible with most computers on the market, including the IBM-PC. And they're all easy to use.

They're also a part of Team Xerox, so they can be serviced by the national Xerox service force and authorized service locations across the country.

So if you're looking for the latest in daisy-wheel printing technology, go with the people who've been in the business the longest. Call 1-800-833-2323, ext. 25, your local Xerox office, an authorized Diablo or Xerox dealer or send your business card to Xerox Corporation, Dept. 25051, P.O. Box 24; Rochester, NY 14692.

FOR MORE INFORMATION FROM XEROX
CIRCLE 142 ON READER SERVICE CARD



XEROX®, Diablo® and the identifying numbers herein are trademarks of XEROX CORPORATION.
IBM® is a registered trademark of International Business Machines Corporation.

Modem Comparison Chart

Manufacturer	Model	Price	Type	Installation Speed	Bundled Software
Anchor Automation Inc. 6913 Valjean Ave. Van Nuys, CA 91406 (818) 997-7758	Volksmodem	\$79.95	DC	External	300
	Volksmodem 12	\$299	DC	External	1200/300
	Mark XII	\$399	DC	External	1200/300
	Mark X	\$169	DC	External	300
	Express	\$439	DC	External	1200/300
Anderson Jacobson 521 Charcot Ave. San Jose, CA 95131 (408) 263-8520	AJ 1212-AD2 Connection	\$695 \$599	DC DC	External Internal (IBM PC)	1200/300 1200/300
	AJ 1212-ST	\$495	DC	External	1200/300
Apple Computer Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010	Modem 300	\$225	DC	External	300
	Modem 1200	\$495	DC	External	1200
Ark Electronic Products 325 Hibiscus Blvd. Melbourne, FL 32901 (305) 724-5260	Model 24K	\$805	DC	External	2400/1200 300
AST 2121 Alton Ave. Irvine, CA 92714 (714) 863-1333	Reach!	\$549	DC	Internal (IBM PC XT short slot)	1200/300
AT&T Consumer Products 5 Wood Hollow Rd. Parsippany, NJ 07054 (201) 581-5185	Model 4000	\$499.95	DC	External	1200/300
	AT&T 103	\$605	DC	External	300
	AT&T 2212C/FDX	\$750	DC	External	1200/300
	AT&T 2224/FDX	\$1045	DC	External	2400/1200/300
Atari 1265 Borregas Ave. Sunnyvale, CA 94086 (408) 745-2000	835*	\$279.95	DC	External	300
	1030*	\$130.95	DC	External	300
*Last known					
Bizcomp 532 Mercury Dr. Sunnyvale, CA 94086 (408) 733-7800	Intellimodem ST	\$499	DC	External	1200/300
	PC: Intellimodem	\$499	DC	Internal (IBM)	1200/300
	Intellimodem XT	\$549	DC	Internal (IBM)	1200/300
	Bizcomp 1012	\$549	DC	External	1200/300
	Versamodem	\$875	DC	External	300
Bo-Sherrel Co. 36133 Niles Blvd. Fremont, CA 94536 (415) 792-0354	M-1A (short-haul 2-10 miles)	\$138	DC	External	600/9600
Bytcom 2169 Francisco Blvd. San Rafael, CA 94901 (415) 485-0700	212 AD	\$495	DC	External	1200/300
Case Rixon Communications Inc. 2120 Industrial Pkwy. Silver Spring, MD 20904 (301) 622-2121	R1224	\$799	DC	External	2400/1200/300
	Executive 212	\$599	DC	Ext or Int	1200/300
	PC 212A	\$499	DC	Internal (IBM PC)	1200/300
Cermetek Microelectronics 1308 Borregas Ave. P.O. Box 3565 Sunnyvale, CA 94088 (408) 734-8150	Security Modem	\$695	DC	External	1200/300
	Infomate 1200	\$595	DC	External	1200/300
	Infomate 1200P	\$495	DC	Internal (IBM)	1200/300
Code-A-Phone P.O. Box 5656 Portland, OR 97228 (800) 547-4683	Tel-A-Modem	\$695.95	DC	External (combo modem/telephone)	1200/300

telephone every time you use the modem.

Internal Versus External

This is one debate that has no clear-cut answer. Both types have numerous advantages and disadvantages. The choice is really a personal one.

An internal modem (an expansion board) fits into an expansion slot inside your computer. An external modem resides outside, connected via an RS-232C port and a cable.

Internal modems tuck neatly away inside the system unit, are automatically transported with the computer, and require no serial port, modem cable, or external power supply. On the other hand, they occupy valuable expansion slots, increase internal heat, show no external lights, can be reset only by turning the computer off and on, and cannot be transferred to an incompatible computer (you cannot use an Apple internal modem inside an IBM PC).

External modems are easily ported to other computers, have lots of indicator lights, have power on/off switches for instant reset, and include DIP switches for special use. On the negative side, they require desk space, a power adapter, a cable between computer and modem, and a special serial communications card (or the capability on a multifunction card).

You may want to give additional consideration to an external modem only because of portability. If you upgrade from one computer to another, you can take the modem along with you. However, an external modem costs more than an internal one—somewhere in the neighborhood of \$100 more—even if you buy through a mail order house.

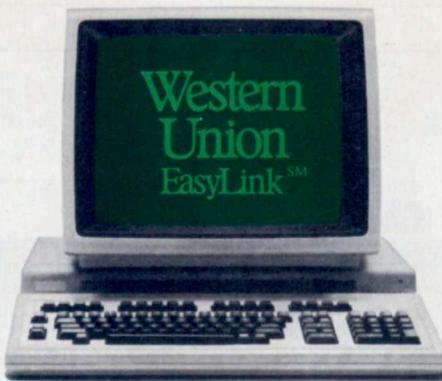
Voice/Data Jacks

As we mentioned before, many direct connect modems (internal and external) include two modular phone jacks—one for data transmissions and one for a voice line. The smarter modems automatically switch between the two, although most change with the flick of a switch.

Self Test

Many modems perform a self test. A pattern generator and error checking circuitry verify the ability to send and receive data. The three tests are analog loop back, digital loop back, and remote digital loop back.

In the analog loop back test, data are sent from the pattern generator



Which electronic mail service delivers much more than mail?

Every one of these electronic mail services does a very good job of delivering the mail.

But only one delivers so many more online services with equal expertise.

The Source.

With The Source, you can have the daily news delivered along with your daily mail. Make airline reservations. Trade stocks. Hold a computer conference. Communicate with thousands of people who share your interests.

Even get the latest word on new hardware and software products, in seconds.

All this, and more, along with the electronic mail service called "the most powerful available anywhere."

And all for just \$49.95,

plus reasonable hourly usage fees.

Call 800-336-3366* and you can have the power of The Source working for you in a matter of minutes.

Or for more information, visit your nearest computer dealer or mail the coupon below.

Please send me more details about The Source.

Name _____ Telephone # _____

Address _____

City _____ State _____ Zip _____

I own a personal computer

yes no

Mail to: Source Telecomputing Corp.
1616 Anderson Road
McLean, VA 22102

7824711

The Source
INFORMATION NETWORK

The most powerful resource
any personal computer can have.

The Source is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc. The Source services are offered in participation with Control Data Corporation © Source Telecomputing Corporation, 1985. MCI Mail is a service mark of MCI Communications Corp. EasyLink is a service mark of Western Union.

*In Virginia or outside the continental U.S. call (703) 821-6666.

COMMUNICATIONS

SourceMailSM
Mailgram® Message Service
PARTICIPATE™
Computer Conferencing
CHAT Interactive
Communications

NEWS & INFORMATION

News Bulletins
UPI News Service
Associated Press
Scripps-Howard News
Service

Accu-Weather™
The Washington Post
Electronic Edition
Sports
BYLINES Feature News

INVESTOR SERVICES

Portfolio Management
Delayed Stock Quotes
Real-Time Stock Quotes
Spear Securities Online
Trading
Media General
STOCKVUE
Donoghue Investment
Newsletter
INVESTTEXT Research
Reports
Management Contents
Publication Abstracts
Employment Services
UNISTOX Market Reports
Commodity World News
BIZDATE Business
Magazine

PERSONAL COMPUTING

MICROSEARCH™

Hardware, Software
Reviews
Member Directory
POST Bulletin Boards
Member Publications

TRAVEL SERVICES

Official Airline Guide
A-Z Worldwide Hotel Guide
Travel, Hotel Tickets
& Reservations
Restaurant Guides
Travel Tips, Tours

SHOPPING & LEISURE

Movie Reviews
Comp-u-store Electronic
Shopping
Games, Educational Quizzes

Modem Comparison Chart...

Manufacturer	Model	Price	Type	Installation	Speed	Bundled Software
Codex 20 Cabot Blvd. Mansfield, MA 02048 (617) 364-2000	5103 5212/ACU	\$425 \$645	DC DC	External External	300 1200/300	-
Comdata Corp. 7900 N. Nagle Ave. Morton Grove, IL 60053 (312) 470-9600	212E2-32	\$237	DC	External	1200	-
Commodore 1200 Wilson Dr. West Chester, PA 19380 (215) 431-9100	1670 VicModem AutoVic 1660	N/A \$99.95 \$149.95 \$129.95	DC DC DC	External External External	1200/300 300 300 300	- AutoTerm
Concord Data Systems 303 Bear Hill Rd. Waltham, MA 02154 (617) 890-1394	CDS 224 ARQ Superduplex	\$1295 \$1695	DC DC	External External	2400/1200 2400/1200	-
CTS Datacomm Products 400 Reiman Ave. Sandwich, IL 60548 (815) 786-8411	CTS OE-1 (for Osborne Executive)	\$135	DC	External	300	Myterm
Datasavers Inc. 440 Maple Wichita, KS 67213 (316) 264-5068	DS 1200 SMT	\$427.50	DC	Internal (Kaypro)	1200/300	S Modem
Datec Inc. 200 Eastowne Dr. Chapel Hill, NC 27514 (919) 929-2135	30 33 Pal 212 Pal Plus	\$225 \$219 \$497 \$595	AC DC DC DC	External External External Internal (IBM)	300 300 1200/300 1200/300	- - - Crosstalk
Develcon Electronics 744 Nina Way Warminster, PA 18974 (215) 443-5450	6212 7212 8212	\$495 \$575 \$650	DC DC DC	External External External	1200 1200/300 1200/300	No No No
Gandalf Data Inc. 1019 S. Noel Wheeling, IL 60090 (312) 541-6060	SAM 224 SAM 212A SAM 201 LDM 408/418	\$795 \$618 \$725 \$795/895	DC DC DC DC	External External External External	2400/1200/300 1200/300 2400/1200/300 4800	- - - -
General DataComm Middlebury, CT 06762 (203) 574-1118	GDC 1200 GDC 300	\$499 N/A	DC DC	External External	1200/300 300	- -
General Electric Consumer Electronics Div. Syracuse NY 13221 (800) 626-2000	3-8200	\$119.95	DC/ AC	External	300	-
Hayes Microcomputer Products 5923 Peachtree Industrial Blvd. Norcross, GA 30092 (404) 449-8791	Smartmodem 300 Smartmodem 1200 Smartmodem 1200B Smartmodem 2400 Micromodem IIe Micromodem 100	\$289 \$699 \$599 \$899 \$289 \$399	DC DC DC DC DC DC	External External Internal (IBM) External Internal (Apple) Internal	300 1200/300 1200/300 2400/1200/300 300 300	Smartcom Smartcom Smartcom Smartcom Smartcom Smartcom
IBM P.O. Box 1328 Boca Raton, FL 33432 (800) 447-4700	PCjr Internal Modem	\$199	DC	Internal (IBM PCjr)	300	-
Incomm Data Systems 115 N. Wolf Rd. Wheeling, IL 60090 (312) 459-8881	2400 FDX EC 212A ER 212A PC 1200	\$899 \$499 \$599 \$499	DC DC DC DC	External External Ext or Int Internal	2400/1200 1200/300 1200/300 1200/300	- - - -

through the transmitter. The receiver routes the data into the error checking circuitry, which compares them with the original data and flags any errors.

The digital loop back test allows you to test another modem. Data are sent from your modem to the receiver of the other modem, through the transmitter, and back to the error checking circuitry in your modem. Note that the digital loop back test requires the help of a person to tend the other modem. The remote digital loop back test is the same as the digital loop back test, but needs no additional person at the other end.

Duplex

Half duplex, or one-way communication, has generally been superseded by full duplex, or two-way communication. Unless you need a modem for specialized use that requires only half duplex operation, stick to full duplex.

Automatic Response

Auto dial/auto answer are two of the more popular modem features. With the old acoustic modems, you had to dial the number by hand. Newer, smarter modems allow you to dial numbers through the software from the keyboard. The modem mimics the tones of the phone to call out. Likewise, the modem can automatically answer the phone, recognizing the tones and beginning appropriate procedures.

Software

Many modem manufacturers bundle software with their modems. For an overview of packages available separately, see the February 1985 issue in which we reviewed 17 telecommunications software packages. Unfortunately, three of the real heavyweights were absent—Hayes *Smartcom II*, US Robotics *Telpac*, and IBM *Personal Communications Manager*.

Smartcom II is the choice of many Hayes Smartmodem and Smartmodem-compatible users. It allows for easy changes in baud rate, bit patterns, and most other modem functions. It provides a directory for storing numbers and log-in procedures that are available at the touch of the button. It requires 96K to run, and retails for \$119. Versions are available for many popular computers.

Telpac is compatible with many popular computers, including the IBM PC and compatibles, Apple II, and computers running CP/M. It supports many modems, including Multi-Tech, Novation, Anchor, Prentice, Hayes,

Ven-Tel, Prometheus, and of course, US Robotics. It includes terminal emulation (VT 52/100, Televideo 910, and TTY ASCII), and the latest version includes windowing and instant access to menus. It requires 192K (256K suggested) and retails for \$99.

Personal Communications Manager is the official IBM communications package for the PCjr. It stores telephone numbers and log-on procedures, transmits and receives files, and keeps track of how long you have been on line. It also includes a handy electronic mail function and the ability to program function keys. *Personal Communications Manager* requires 128K and sells for \$100.

If software is not bundled with the modem you buy, you must purchase it. You absolutely need telecommunications software to run a modem. IBM PC owners can probably find a copy of *PC Talk III* at a local user's group. *PC Talk III* is called freeware, which means you are encouraged to copy and pass out the software. Not only does it carry an attractive "price," but it is a good telecommunications program.

The two types of programs generally available are menu-driven and command-driven. Menu-driven software (like Hayes *Smartcom II*) is easier to learn, but takes longer to use. Command-driven software (like Microstuf *Crosstalk XVI*) is harder to learn, but faster to use once learned. Features to look for include selectable baud rate, selectable bit patterns, directory, automatic log-on procedures, file transfer prompts, automatic redial, and help menus.

The Mainframe Connection

Right now, 2400 baud seems to be the "state-of-the-art" speed for microcomputer modems, with 4800 baud and 9600 baud looming on the horizon. Yet telecommunications within networks and between mainframes exceeded that speed long ago. These sophisticated (and expensive) modems shoot between 9600 and 19,200 bits per second down the line—using the same RS-232C port found on your computer.

You can gain the speed benefits of these sophisticated modems if you are willing to bear the cost of the modem and the cost of leasing a dedicated telephone line. The basic level of quality you can expect is termed 3002. Better quality lines are rated C-1, C-2, and so on. Higher speeds increase the probability of transmission errors, so anything less than a leased line is data suicide.

Modem Comparison Chart...

Manufacturer	Model	Price	Type	Installation Speed	Bundled Software
International Data 7 Wellington Rd. Lincoln, RI 02865 (401) 333-6200	Model 6220 Model 6240 (Limited distance)	\$300 \$400	DC DC	External External	9600/4800/2400 - 9600/4800/2400 -
Lane Telecommunications 7050 Port West Houston, TX 77024 (713) 862-7200	Lane IBCM Lane IBCM	\$825 \$625	DC DC	External Internal (IBM PC)	300 300
Lockheed-Getex 1100 Circle 75 Pkwy. Atlanta, GA 30339 (404) 951-0878	GTX 100 Secure modem Data Sentry Model 2000	\$995 \$995	DC DC	External External	1200/300 1200/300
Micom Systems Inc. 20151 Nordhoff St. Chatsworth, CA 91311 (818) 998-8844	DialNet 3024+ DialNet 3024 DialNet 3012+ DialNet 3012	\$895 \$795 \$595 \$495	DC DC DC DC	External External External External	2400/1200 2400/1200 1200/300 1200/300
Microcom Inc. 1400A Providence Hwy. Norwood, MA 02062 (617) 762-9310	MacModem 1200 MacModem 2400 PC/2400 Era 2 Apple IIe Era 2 IBM PC Era 2 PCjr	\$599 \$899 \$799 \$499 \$499 \$499	DC DC DC DC DC DC	External External Ext or Int Internal Internal (IBM) Internal (PCjr)	1200/300 2400 2400/1200/300 1200/300 1200/300 1200/300
Microperipheral Corp. 2565 152nd Ave. NE Redmond, WA 98052 (206) 881-7544	Model APV (C64) Model APA (Atari)	\$179.95 \$179.95	DC DC	External External	300 300
Microplex Inc. 1977 State College Blvd. Anaheim, CA 92806 (714) 634-1535	Versacom 300 Versacom 212	\$119 \$439	DC DC	Internal External	300 1200
Multi-Tech Systems Inc. 82 Second Ave. SE New Brighton, MN 55112 (612) 631-3550	MultiModem MultiModem PC MultiModem 224	\$549 \$499 \$795	DC DC DC	External Internal (IBM PC) External	1200/300 1200/300 2400/1200/300
Mura Corp. 385 W. John St. Hicksville, NY 11801 (516) 935-4888	MM-100	\$69.95	DC	External	300
NCR Corp. 1700 S. Patterson Blvd. Dayton, OH 45479 (513) 445-5000	1200 PC	\$530		Ext or Int	1200/300
NEC America Inc. 1012 Stewart Dr. Sunnyvale, CA 94086 (408) 737-7711	N 1230 212 AR DSP 2420	\$450 \$695 \$950	DC DC DC	External External External	1200 1200/300 2400/1200/300
Novation Inc. Box 2875 20409 Prairie St. Chatsworth, CA 91311 (800) 423-5419 (818) 996-5060	Smart-Cat Plus Apple-Cat II Access 1-2-3 212 Apple Cat J-Cat 212 Auto Cat	\$499 \$595 \$595 \$319 \$149 \$695	DC DC DC DC DC DC	Ext or Int Internal Internal (IBM) Internal (Apple) External External	1200/300 1200/300 1200/300 1200/300 300 1200/300
OmniTel 3090 Oakmead Village Dr. Santa Clara, CA 95051 (408) 986-8236	Encore 1200 Encore 1200A/B Encore 300 Encore 300A/B	\$499 \$399 \$289 \$269	DC DC DC DC	External Internal External Internal	1200/300 1200/300 300 300
Panasonic One Panasonic Way Secaucus, NJ 07094 (201) 348-7000	KX-D4130 KX-D401 KX-D402	\$199.95 \$99.95 \$299.95	DC DC DC	External (phone-modem) External External	300 300 1200/300

The first library

We've written more Macintosh programs than any other software company:

Microsoft® Multiplan®, Microsoft File, Microsoft Word, Microsoft BASIC and Microsoft Chart.

But we can't write everything. So when we find something really excellent out there, we publish it.

Every program has to sweat out an interview.

Because we've begun to build up an impressive body of Macintosh work, we founded Microsoft MacLibrary™ programs to house them.

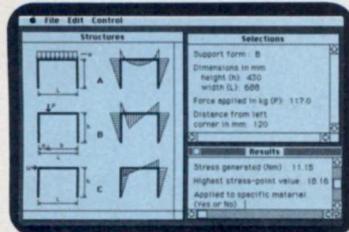
Programs for business, for learning, for fun.

And these disks can't just roll in off the street. Each program has been exhaustively reviewed, previewed, and scrutinized.

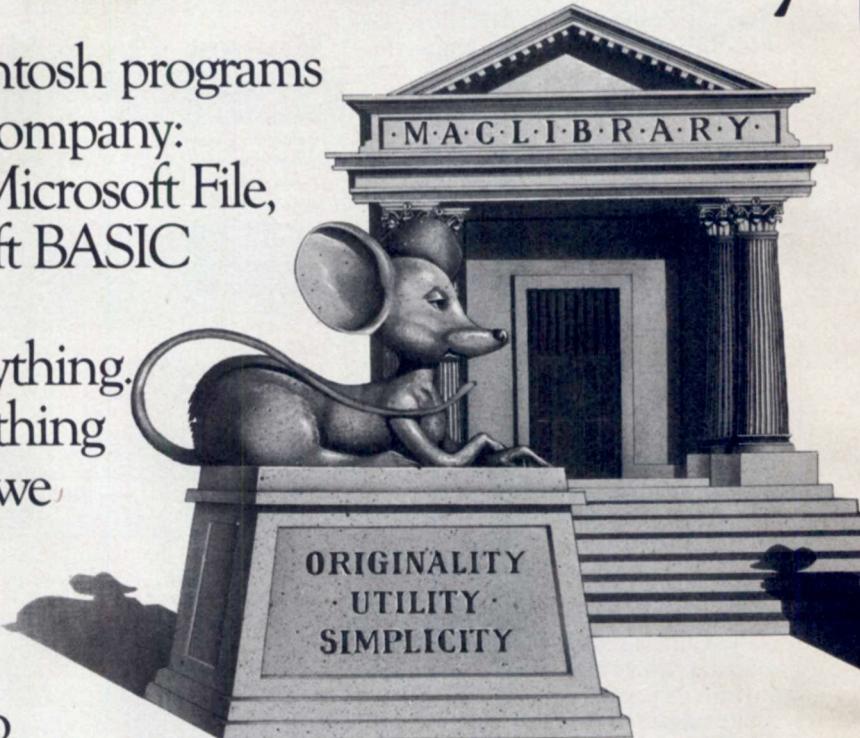
We look for highly original, highly useful programs that are easy to learn and use.

Our first releases.

The renowned programming language, Logo, has now come to Macintosh. A mainstay of university curriculums, Logo teaches programming concepts, techniques, and problem solving strategies. And it makes it all fun to boot. Intriguing enough to challenge even an advanced programmer—or motivate a child—this is Logo's latest

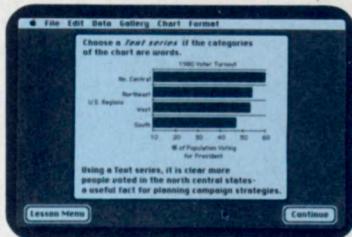
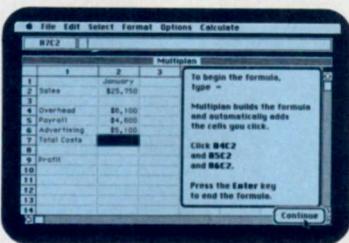
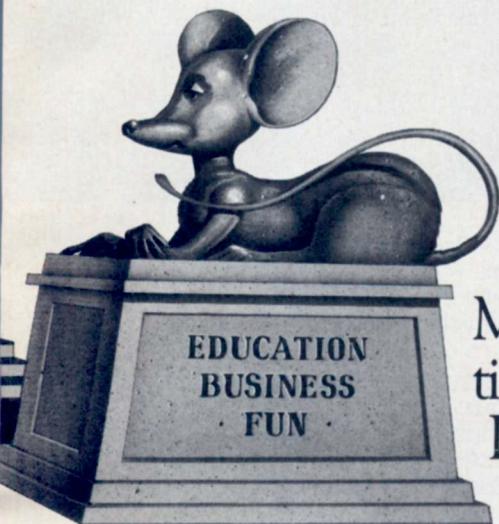


Logo by Logo
Computer Systems Inc.



dedicated to Macintosh.TM

generation. And it takes full advantage of all of Mac's easy to use features.



Learning Microsoft Multiplan[®]
and Microsoft Chart by Micro Courseware Corp.

Learning Microsoft Multiplan and Microsoft Chart is a superb interactive instructional program by Micro Courseware Corp. It walks you through the basics and into the intricacies of these sophisticated business tools. Teach yourself quickly and simply how to produce presentation quality graphics. As well as what-if projections, portfolio managers, and financial models.

Finally, there's Entrepreneur[™] by Harvard Associates. You're in the software business, competing against one to eight other capitalists of either the human or computer persuasion. With 36 months to boom or bust, prosper or squeak through.

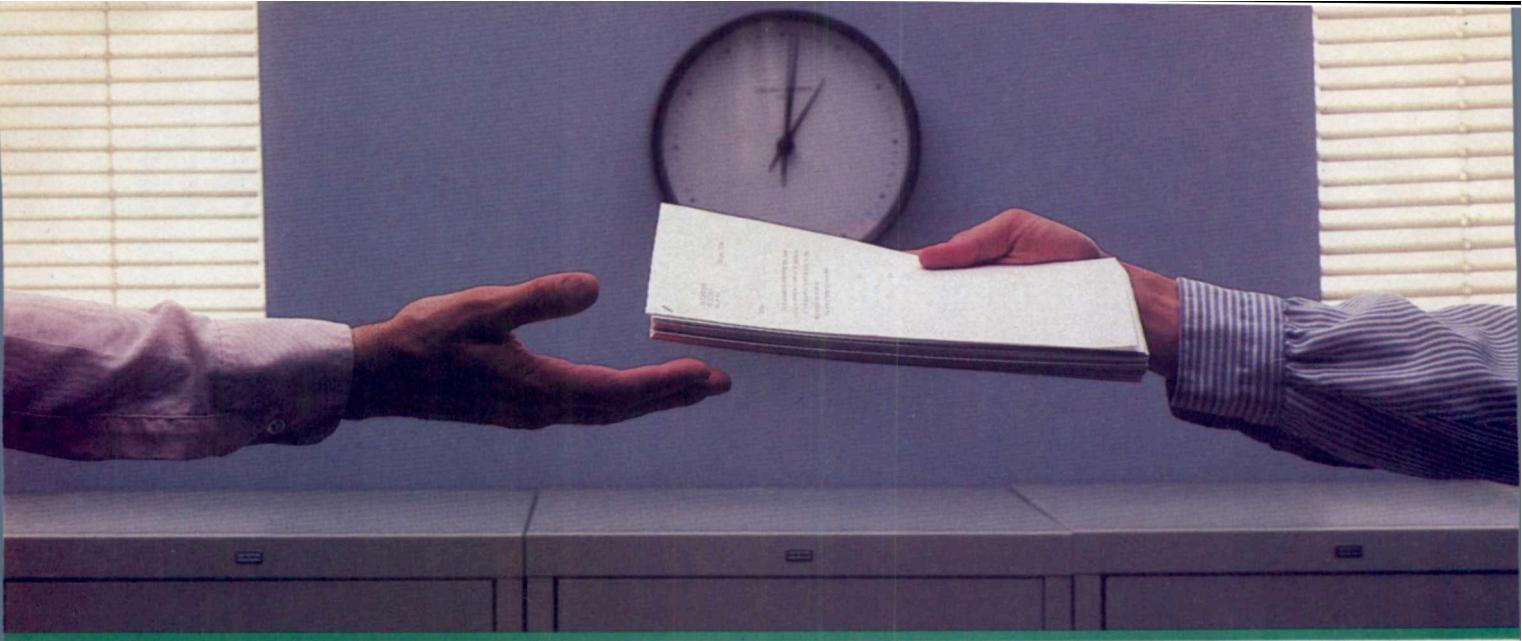
Check out a few programs.

For a list of your nearest dealer stocking MacLibrary software, just call (800) 426-9400. Or in Washington State, Alaska, Hawaii and Canada, call (206) 828-8088. We think you'll be impressed. Because making it into MacLibrary speaks volumes.

MICROSOFT

Microsoft and Multiplan are registered trademarks and MacLibrary and The High Performance Software are trademarks of Microsoft Corporation. Macintosh is a trademark licensed to Apple Computer, Inc. Entrepreneur is a trademark of Harvard Associates.

CIRCLE 117 ON READER SERVICE CARD



2400 bps modems: Do you Really need another speed?

- Is the shift from 300 to 1200 bps going to repeat itself at 2400 bps? The answer is both yes and no. There certainly are applications for 2400 bps asynch dial-up modems, but we shouldn't expect 1200 bps to die overnight.
- 2400 bps modems can improve throughput, thereby getting tasks done quicker and more economically. However, 1200 bps has become the virtual standard for professional dial-up communications, and most users are satisfied with it. So why consider a 2400 bps modem at all?
- One reason is flexibility. If the modem you select operates at all three speeds (300, 1200 & 2400) in accordance with accepted industry standards, it will serve virtually all dial-up applications now and in the foreseeable future.
- The modem you select should be the MultiModem224. It is Bell 212A and 103 compatible at 1200 and 300 bps, and CCITT V.22bis compatible at 2400. It is also 100% compatible with the Hayes command set, meaning that it will work with virtually all communications software packages, at all three speeds. Other features include both synchronous and asynchronous operation, full intelligence and a phone number memory.
- The MultiModem224 is available in both desktop and IBM PC™ internal card versions. (There is also a rack-mounted version for central sites.) And as a bonus, we provide free offers from ten of the most popular on-line information services, including CompuServe™, Dow Jones™ and The Source™.
- A 2400/1200/300 bps modem is just a plain good investment. Why not let the MultiModem224 provide your communications for both today and tomorrow?

MultiTech Systems

The right answer every time.

82 Second Ave. S.E., New Brighton, MN 55112 (612) 631-3550, TWX: 910-563-3610

CIRCLE 136 ON READER SERVICE CARD

MultiTech Systems

MultiModem 224
2400/1200/300 BPS Intelligent Modem

1200
300 ANS

Telecommunication Tolls

Hardware and software prices fluctuate dramatically. Usually, the trend is downward. A quick look through the advertisements of mail order houses confirms that many 300 baud modems (which do an admirable job of accessing telecommunications services) cost under \$100. Add the cost of a cable (roughly \$25) and you are ready to access the world.

On the other hand, a feature-packed top-of-the-line modem can cost you several hundred dollars. You must decide what will best meet your needs. For the home, where telecommunication is more a luxury than a necessity, 300 baud is a good starting point—inexpensive and fast enough for occasional use. Businesses and professionals probably need more speed—a 1200/300 baud modem should do the trick. To steal a phrase, they give you the most baud for the buck.

The new 2400 baud modems are lightning fast, but at this time, the scarcity of compatible hardware and acceptable high speed links make this a longer term investment. However, just about all include 1200 and 300 baud capabilities, so if you buy now, you will not have to upgrade in the future. Falling prices, increased sales, and wider service will make 2400 baud modems an attractive investment over the next year.

All this assumes you already own a serial card with an RS-232C serial port. Most multifunction cards and some computers include one as standard equipment. If not, you must purchase and install an expansion card with an RS-232C serial port before you can use a modem.

To use a modem, you must use a telephone line, and that means paying telephone charges just as if you were talking to someone. The usual rules apply: calling during business hours incurs the most expensive tolls, while calling after 11:00 p.m. local time gets you the cheapest rate. Yes, you can put a big dent in your pocketbook by calling all the marvelous bulletin boards and services across the country:

Note that you can use alternate long distance services like MCI and Sprint, but your software and hardware should pause and recognize the second dial tone that sounds when you connect with the network. Otherwise, the modem will begin to transmit the phone number, log-on sequence, and other data before you actually enter the network, resulting in a telecommunications tangle.

Fortunately, to limit long distance

Modem Comparison Chart...

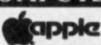
Manufacturer	Model	Price	Type	Installation	Speed	Bundled Software
Paradyne 8550 Uilmerton Rd. Largo, FL 33540 (813) 530-2000	HDX-12000	\$3600	DC	External	12000	-
	FDX 2400	\$805	DC	External	2400/1200	-
	MPX series	\$950-3400	DC	External	2400/9600	-
	VHS series	\$10-13K	DC	External	14.4K-19.2K	-
Penril Data 207 Perry Pkwy. Gaithersburg, MD 20877 (301) 921-8600	AD 300/1200	\$650	DC	External	1200/300	-
	2024	\$895	DC	External	2400/1200	-
	Datalynx 224	\$895	DC	External	2400/1200/300	-
Prentice Corp. 266 Caspian Dr. Sunnyvale, CA 94088 (408) 734-9810	Popcom C-100	\$445	DC	Internal (IBM PC)	1200/300	-
	Popcom X-100	\$475	DC	External	1200/300	-
	212 TCM	\$795	DC	Ext or Int	1200/300	-
Prometheus Products Inc. 4527 Fremont Blvd. Fremont, CA 94538 (415) 490-2370	ProModem 1200	\$495	DC	External	1200/300	ProCom
	ProModem 1200A	\$449	DC	Internal (Apple)	1200/300	-
	ProModem 1200B	\$399	DC	Internal (IBM)	1200/300	Mite
	ProModem 1200M	\$549	DC	Internal (Mac)	1200/300	ProComM
Quadram 4355 International Blvd. Norcross, GA 30093 (404) 923-6666	Half Card	\$495	DC	Internal (IBM)	1200/300	Quadtalk
	Integral	\$595	DC	Internal (IBM)	1200/300	Quadtalk
	Standalone	\$695	DC	External	1200/300	Quadtalk
Qubie Distributing 4809 Calle Alto Camarillo, CA 93010 (805) 482-9829	212A/1200E	\$329	DC	External	1200/300	PC Talk
	PC 212A	\$299	DC	Internal (IBM)	1200/300	PC Talk
Qytel 120 Route 17 N. Paramus, NJ 07652 (201) 599-0380	1200	\$695	DC	Ext or Int	1200/300	Crosstalk
	2400	\$1195	DC	Ext or Int	2400/1200	Crosstalk
Racal-Vadic 1525 McCarthy Blvd. Milpitas, CA 95035 (408) 946-2227	2400PC	\$795	DC	Internal (IBM)	2400/1200/300	George
	2400V	\$795	DC	External	2400/1200/300	George
	Maxwell 300	\$295	DC	Ext or Int (IBM)	300	George
	Maxwell 1200	\$495	DC	Ext or Int (IBM)	1200/300	George
Tandy Radio Shack Fort Worth, TX 76102 (817) 390-3011	DC 2212	\$399.95	DC	External	1200/300	-
	DC Modem II	\$199.95	DC	External	300	-
	300 Modem	\$179.95	DC	Internal	300	-
Tecmar Inc. 6225 Cochran Rd. Cleveland, OH 44139 (216) 349-0600	Modem 1200	\$500	DC	Internal (IBM PC)	1200/300	Tecmar
Tek-Com Corp. 1887 O'Toole Ave. San Jose, CA 95131 (408) 263-7400	202S	\$375	DC	Ext or Int	Bell 202	-
	202T	\$375	DC	Ext or Int	Bell 202	-
	ALD series	\$285	DC	Ext or Int	0-9600	-
	ALDXR	\$300	DC	Ext or Int	0-9600	-
Teneron Corp. 6700 W. 105th St. Beaverton, OR 97005 (503) 646-1599	TC series	\$995-1995	DC	External	1200/300	-
	T series	\$695-1495	DC	External	1200/300	-
Texas Instruments P.O. Box 809063 Dallas, TX 76380 (214) 995-6611	TI Internal	\$750	DC	Internal (TI)	1200/300	Yes
Theall Engineering Co. P.O. Box 336 Oxford, PA 19363 (215) 932-3488	Modemphone	\$119	DC	External (combo modem/phone)	300	-
Touchbase Design 1447 S. Crest Dr. Los Angeles, CA 90035 (213) 277-1208	Touchbase Modem	\$129	DC	Internal (for NEC 8201A and notebook/ lap portables)	300	-

**DEALERS
WE BUY
EXCESS
INVENTORIES**

CONROY

TELEX 910 380 3980
ALL MAIL: 12060 SW Garden Place, Portland, OR 97223

FOR YOUR APPLE

COMPUTERS

SYSTEMS IN STOCK CALL
FLOPPY DISK DRIVES

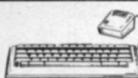
	LIST	CONROY
MICRO-SCI, A2 Disk Drive, 143K	\$ 345	\$ 195
A2 Controller Card	\$ 100	\$ 60
Half Height Drive for IIe	\$ 260	\$ 195
Half Height Drive for IIc	\$ 299	\$ 209
RANA, Elite I, 163K, 40 Track	\$ 299	\$ 199
Elite I, 326K, 80 Track	\$ 499	\$ 369
Elite Controller	\$ 145	\$ 79
TEAC, T40 Half Ht. Drive, 163K, Direct	\$ 249	\$ 169
Controller Card for T40 by ComX	\$ 79	\$ 45
T80 Half Ht. Drive, 326K, Double	\$ 399	\$ 299
Controller Card for T80 by Teac	\$ 85	\$ 55

HARD DISKS

	LIST	CONROY
QUARK, QC10 for IIc/Ile/III/MAC	\$ 199	\$ 1595

OTHER HARDWARE

	LIST	CONROY
CCS, 7711 or 7710-A Interface, ea.	\$ 115	\$ 85
CPS/EASTSIDE, Wild Card II (copier + IIe)	\$ 140	\$ 99
COMX, 80 Col. + 64K RAM Card (Ile) ea.	\$ 199	\$ 99
16K RAM Card (II +), 1 yr ltd wty	\$ 119	\$ 29
HAYES, Mac II/I Joystick (II +/IIe)	CALL	
KENSINGTON, System Saver Fan	\$ 90	\$ 45
KEY TRONIC, KB200 Keyboard	\$ 299	\$ 188
KOALA, Muppet Keys	\$ 80	\$ 45
Touch Tablet w/Micro Illustrator (IIe/IIc)	\$ 125	\$ 79
KRAFT, Joystick (II +/IIe)	\$ 65	\$ 45
Game Paddles (II +/IIe)	\$ 50	\$ 39
MICROSOFT, 280 Premium Softcard (Ile) \$ 399	\$ 275	
ORANGE MICRO, Grappler Plus (II +/IIe)	\$ 149	\$ 99
Serial Grappler	\$ 119	\$ 79
16K Buffer Board for Grappler Plus	\$ 99	\$ 59
Buffered Grappler Plus, 16K	\$ 239	\$ 159
PCP, Applicard, 6 MHz, 14 features	\$ 375	\$ 250
PR ELECT., Super Fan II wisure protector	\$ 89	\$ 59
TITAN, Accelerator IIe	\$ 319	\$ 219
128K RAM Card (II +)	\$ 269	\$ 189
TRACKHOUSE, Numeric Key Pad (II +/IIe)	\$ 149	\$ 99
TG, Selector	\$ 40	\$ 25
Joystick or Game Paddles, each	\$ 35	\$ 25
VIDEX, Ultra Term (II +/IIe)	\$ 379	\$ 279
VideoTerm 80 Col. Card (II +/IIe)	\$ 279	\$ 175
PSIO Interface Card	\$ 229	\$ 145
WICO, Smartcard (spec. II +/IIe)	\$ 199	\$ 159


MACINTOSH

BUSINESS SOFTWARE
UTILITIES SOFTWARE

	LIST	CONROY
ALS, Word or List Handler, ea.	\$ 80	\$ 36
Handler Pak (Word/List/Spell)	\$ 170	\$ 73
APPLIED SOFT TECH., VersaForm	\$ 289	\$ 179
ASHTON-TATE, dBase II (Reg CP/M 80)	\$ 495	\$ 269
BJB, Job Cost	\$ 595	\$ 365
BRDERRBUND, Print Shop	\$ 50	\$ 29
Print Shop Graphics Library	\$ 25	\$ 18
Bank St. Writer or Speller, ea		
(specify II +/Ile/IIc)		
Bank St. Combo (Writer & Speller)	\$ 140	\$ 85
CONTINENTAL, Home Accountant	\$ 100	\$ 65
CREATIVE SOLUTIONS, MacForth Level I	\$ 149	\$ 95
CREIGHTON, Home Pak or Mac Office, ea.	\$ 39	\$ 26
Mac Spell +	\$ 99	\$ 66
DESKTOP, 1st Base	\$ 195	\$ 125
DOW JONES, Market Manager Plus	\$ 249	\$ 159
EXPERTINTELLIGENCE, ExperLogo	\$ 150	\$ 80
FIRST BYTE, Smooth Talker	\$ 150	\$ 95
FORETHOUGHT, Fact Finder	\$ 150	\$ 95
HAYDEN, Sargon III	\$ 50	\$ 31
HUMAN EDGE, Sales or Mgmt Edge, ea.	\$ 250	\$ 159
Mind Prober	\$ 50	\$ 32
INFOCOM, Hitchhiker's Guide	\$ 40	\$ 25
INNOVATIVE, Flip-n-File, 40	\$ 30	\$ 19
KENSINGTON, Disk Case, 36	\$ 30	\$ 22
KOALA, Mac Vision	\$ 400	\$ 229
LIVING VIDEO/TEXT, Think Tank	\$ 145	\$ 85
LOTUS, Jazz	\$ 595	\$ 395
MAIN STREET, Filer or Writer, each	\$ 199	\$ 125
MEGAHAUS, Megaflier	\$ 195	\$ 125
Megaworks or Megamerge, each	\$ 125	\$ 79
MICROSOFT, Business Pak	NEW	\$ 395
MultiPlan, Word, or File, each	\$ 195	\$ 129
WPS, Mac the Knife, v. 1	\$ 39	\$ 25
MONOGRAM, Dollars & Sense	\$ 150	\$ 95
NOVATION, Smartplus Modem w/Software	\$ 499	\$ 349
ODESTA, Helix	\$ 399	\$ 265
PENGUIN, Graphics Magician	\$ 50	\$ 32
PROVUE, Overview	\$ 299	\$ 185
SIMON & SCHUSTER, Typing Tutor III	\$ 50	\$ 30
SOFTW. PUBL., PFS, File or Report, ea	\$ 125	\$ 79
PFS: File & Report Combo	\$ 195	\$ 125
SOFWARE ARTS, T/K Solver	\$ 249	\$ 159
STATE OF THE ART, Electronic Checkbook	\$ 80	\$ 50
STONEWARE, DB Master	\$ 195	\$ 125
TELOS, File Vision	\$ 195	\$ 125
WARNER, Desk Organizer	\$ 149	\$ 99

LIVING VIDEO/TEXT, Think Tank
MECA, Managing Your Money
MEGAHAUS, Megawriter
MICROSOFT
MINICOM, Multi-Plan (Ap DOS)
MONSTER, WordJuggler & Lexicheck (IIe/IIc)
MONSIBLE, Sensible Speller
SIERRA/ON-LINE, Homework
SOFTONE, Tax Preparer for '84 taxes
STONER, Kit for Color Printer
HUMAN EDGE, Sales or Mgmt Edge, ea.
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT Copy II Plus (bit copier)
FILER, Utility & Apple DOS 3.3
BEAGLE, GPLE, Alpha Plot or B. Basic, ea
PROMIS, Disk Quik, AP, Mech. or I/O, Silver, ea
FRONTIER, Full Line IN STOCK
BORLAND, Turbo Pascal
3 Pak (Psc, Turbo Tut, Toolbox)
CENTRAL POINT

-LA POINTE INC.

C17

© 1984 by Conroy-LaPointe, Inc. All Rights Reserved

ORDER NOW (800) 547-1289

SAVE 25% - 75% OFF LIST!!!

FOR YOUR IBM-PC, XT, AT or JR

COMPUTER SYSTEMS

— Call for Details —

256K IBM - PC

360K
Disk Drives
by CDC

90 Day
Limited Warranty
By Us**COMPAQ** Portable,

256K, 2 360K Disk Drives

SANYO 555-2

256K, 2 320K Disk Drives

ZENITH256K, 2 320K Disk Drives,
MS DOS 2.1, 8088 Chip, 2/S/P

HARD DISKS & TAPE BACKUP

KAMERMAN, Internal 10 meg kit (Megafight 100)	\$ 895	\$ 749
External 10 meg kit	\$ 1295	\$ 995
MF-10/10, H Disk, tape back, cont, power	\$ 2295	\$ 1795
MAYNARD, Internal 10 meg kit w/icon. (WSI)	\$ 1595	\$ 1595
MICRO SYSTEMS, 10 meg w/controller	\$ 895	\$ 695
QUADRAM, Quaddisks Int. w/controller	In STOCK	
RANA, External 10 meg w/controller	\$ 1495	\$ 1095
Internal 10 meg w/controller	\$ 995	\$ 795
TALLGRASS, 12 meg disk, 20 meg tape, interf.	\$ 3044	\$ 2124
25 meg disk, 55 meg tape, interf.	\$ 3660	\$ 1600

FLOPPY DISK DRIVES

CDC, Limited 30 day warranty, Call for quantity prices	
FULL HEIGHT,	
HALF HEIGHT,	
IBM, Disk Drive Controller Card	\$ 195
MAYNARD, Controller Card w/pata port	\$ 300
Controller Card w/serial port	\$ 310
Sandstar Cont Card (accepts 3 modules)	\$ 265
PERFECT DATA, Head Cleaning Kit	\$ 16
	\$ 12

OTHER HARDWARE

LIST CONROY PRICE

AST, SixPak Plus, 64K \$259

SixPak Plus, 256K, S/P/CC + SW \$ 695 \$ 395

SixPak Plus, 384K, S/P/CC + SW \$ 895 \$ 465

Game Port for SixPak \$ 50 \$ 39

Preview™ Graphics Card w/para, 64K \$ 395 \$ 445

Advantage™ Multif. Bd. for AT, 128K \$ 595 \$ 445

I/O Plus II, S/P/CC \$ 215 \$ 150

I/O Plus II, S/P/CC/G \$ 265 \$ 185

I/O Plus II, 2/S/P/CC/G \$ 315 \$ 215

Port Kits - ser, para, or game, ea. \$ 50 \$ 39

MonoGraphPlus™ P/C (for Lotus) \$ 495 \$ 375

PCNet, Starter Kit, PC002 \$ 1090 \$ 790

PCNet, Circuit Board, PC001 \$ 695 \$ 365

MegaPlus Products IN STOCK CALL

COMX, NEW

Econoram™ Plus, 384K to 1.5 meg, board, S/P/CC/G Fasttrak & Spooler \$265

Econoram™ full 384K board \$ 195 \$ 195

CURTIS, UNI-1 Monitor tilt/swivel base \$ 40 \$ 30

3-9" 30° Keyboard Extension Cable \$ 250 \$ 149

HAUPTPAGE HOME 8087 Chip \$ 295 \$ 235

8087 Math Pak (Chip & softw.) \$ 180 \$ 138

HAYES, Mach II Joystick \$ 45 \$ 29

Mach III (PC or Jr.) \$ 55 \$ 35

HERCULES, Color Card w/para. \$ 245 \$ 169

Mono Graphic Card \$ 495 \$ 329

IBM, Disk Drive Controller Card \$ 195 \$ 125

KENSINGTON, Masterpiece™ \$ 140 \$ 99

PC Saver™ Line Cord w/filter \$ 50 \$ 35

KEY TRONIC, KB5151, Std. Keyboard \$ 255 \$ 195

KB5150, Std. Keyboard \$ 205 \$ 159

KOALA, Speed Key System \$ 100 \$ 63

Speed Key Tables w/software \$ 200 \$ 139

Koala Pad w/PC Design \$ 150 \$ 89

Multifunction (6) Card \$ 89 \$ 79

Memory Card no RAM \$ 195 \$ 169

Memory Card 256K \$ 495 \$ 395

Floppy Cont. Card (accepts 3 modules) \$ 265 \$ 205

Hard Disk I/F Module \$ 495 \$ 399

Hard Disk Cable \$ 30 \$ 27

Serial Port Module \$ 95 \$ 79

Para or Clock Cal. Module, ea. \$ 50 \$ 49

Gama Adapter Module \$ 49 \$ 43

Memory Module, OK \$ 122 \$ 99

Memory Module 256K \$ 422 \$ 357

10 meg, Hard Disk Kit & Cont Card \$ 1595 \$ 1150

OTHER HARDWARE

LIST CONROY PRICE

MICROSOFT, Mouse (for PC) \$ 195 \$ 135

Serial Mouse \$ 195 \$ 135

System Card, 64K \$ 395 \$ 275

System Card, 256K \$ 625 \$ 450

MOUSE SYSTEMS, PC Mouse & Paint \$ 295 \$ 189

PARADISE, Modular Graphics Card \$ 395 \$ 285

Parallel or Serial Port, ea. \$ 95 \$ 65

PERSYST, NEW

PC/Mono Board, w/para port \$ 250 \$ 195

PC/Color Graphics Bd w/light pen & IF \$ 244 \$ 176

BOB Board Color Adapter, hi res. \$ 595 \$ 465

PLANTRONICS,

Color Bd & Colormagic, 16 color w/para \$ 559 \$ 395

Color Bd & Draftsman, 16 color w/para \$ 559 \$ 395

QUADRAM,

Quadboard 64K, to 384K, S/P/CC/G \$ 245

Quadboard, no RAM, expand to 384K \$ 295 \$ 225

Quadboard 256K, to 384K, S/P/CC \$ 395 \$ 295

Quadboard, 384K (full), S/P/CC/G \$ 795 \$ 495

Quadboard II, 64K, to 256K, 2/S/CC \$ 395 \$ 265

Quadboard II, 256K, 2/S/CC \$ 595 \$ 395

Quad 512 + 64K w/serial port \$ 325 \$ 245

Quad 512 + 256K w/serial port \$ 550 \$ 399

Quadcolor I, board, 4 colors \$ 895 \$ 625

Upgrade Quadcolor I to II it \$ 275 \$ 199

Quadview, board, Mono, S/P/CC \$ 345 \$ 269

Quadchrome Monitor, 12" RGB Color \$ 695 \$ 495

Quadchrome II Monitor, 14" RGB Color \$ 650 \$ 450

Amberchrome Monitor, 12" Amber \$ 250 \$ 165

Quartet 3278 \$ 1195 \$ 1050

Quadnet VI \$ 2295 \$ 1545

Quadnet IX \$ 1995 \$ 1745

Quadrilink \$ 495 \$ 385

Quadsprint \$ 645 \$ 495

WICO, Smartboard Keyboard \$ 45 \$ 29

TECMAR, Jr. Captain \$ 400 \$ 279

★ 256K ★

CHIP KIT

\$99

9 Each, 4256 chips

150 ns

\$13 ea.

4256 chip, 150 ns

★ 64K ★

CHIP KIT

\$19

9 Each, 4164 chips

90 Day Warranty by us

PRICES ARE

DROPPING,

SO CALL!

Call for Larger

Quantity Prices

★ ComX ★

EconoRAM Plus™

\$265

384K Multifunction RAM Board

expandable to 1.5 Megabyte

Works like AST SixPakPlus™ with

capacity for up to 1.5 meg, game port,

FastRak™ RAM Disk and Spooler Software.

With FastRak™ and Spooler

Fully Compatible, 1 Year Limited Warranty.

Works on DOS 1.1, 2.0 or 2.1

Prices and availability subject to change. Call.

4

1

HOME & EDUCATIONAL

UTILITIES

LIST CONROY PRICE

MICROSTUF, Crosstalk XVI (PC or Jr) \$ 195 \$ 129

MOUSE SYSTEMS, PC Paint \$ 99 \$ 69

NORTON, Utilities (14 prgms) NEW VERSION \$ 100 \$ 65

OPEN SYSTEMS, BASIC Interpreter \$ 195 \$ 130

ROSESOFT, Prokey \$ 130 \$ 79

WESTERN UNION, Easy Link Mail Mngr \$ 95 \$ 59

ARMONK Executive Suite \$ 40 \$ 27

BPI, Personal Accounting \$ 99 \$ 63

CONTINENTAL, Home Accountant (Jr) \$ 75 \$ 59

Home Accountant Plus (PC) \$ 150 \$ 90

DON JONES, Home Budget \$ 139 \$ 92

KOALA, Graphics Exhibitor (Jr) \$ 40 \$ 25

MONGRAM, Dollars & Sense w/forecast \$ 180 \$ 110

SCARBOROUGH, MasterType (PC or Jr) \$ 40 \$ 25

Your Personal Net Worth \$ 100 \$ 63

SIMON & SCHUSTER, Typing Tutor III \$ 50 \$ 33

PLUS: BPI, CBS, COMPREHENSIVE, DAVIDSON,

HARCOURT, PBL CORP.

RECREATIONAL

BLUECHIP, Millionaire, Barron, Tycoon, ea. \$ 60 \$ 39

BRODERBUND, Large Inventory In Stock \$ 100 \$ 22

ELECTRONIC ARTS, Large Inventory In Stock \$ 100 \$ 22

HAYDEN, Sargon III (Chess) \$ 50 \$ 34

Hitchhiker's Guide \$ 40 \$ 25

Zork I, II, or III, ea. \$ 40 \$ 25

MICROSOFT, Flight Simulator (PC or Jr) \$ 50 \$ 33

ORIGIN, Ultima III (PC or Jr) \$ 60 \$ 39

PROFESSIONAL, Trivia Fever (PC or Jr) \$ 40 \$ 25

SIERRA/ON-LINE, Ultima II (PC or Jr) \$ 60 \$ 49

Frogger \$ 35 \$ 23

SPECTRUM HOLOBYTE, Gato \$ 40 \$ 25

SPINNAKER, President's Choice, Amazon \$ 40 \$ 25

Fahrenheit, Rendezvous, Dragon, each \$ 40 \$ 25

4

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

Modem Comparison Chart...

Manufacturer	Model	Price	Type	Installation Speed	Bundled Software
Transend Corp. 2190 Paragon Dr. San Jose, CA 95131 (408) 946-7400	AMC-300	\$275	DC	Internal (Apple) 300	-
	MDM-1200	\$695	DC	External 1200/300	-
	PCM-1200	\$549	DC	Internal (IBM) 1200/300	-
	InfoPhone	\$499	DC	Ext or Int 1200/300	Transend
Tri-Data 505 E. Middlefield Rd. Mountain View, CA 94039 (415) 969-3700	Oz Guardian	\$750	DC	External 1200/300	-
Universal Data Systems 5000 Bradford Dr. Huntsville, AL 35805 (205) 837-8100	UDS-103	\$195	DC	External 300	-
	UDS-212A/D	\$645	DC	External 1200/300	-
	UDS-9600	\$2650	DC	External 9600	-
US Robotics 8100 McCormick Blvd. Skokie, IL 60076 (312) 733-0497	Courier 2400	\$895	DC	External 2400/1200/300	Telpac
	Microlink 2400	\$895	DC	Internal (IBM) 2400/1200/300	Telpac
	Password	\$449	DC	External 1200/300	-
	Password 300	\$199	DC	External 300	-
Ven-Tel Inc. 2342 Walsh Ave. Santa Clara, CA 95051 (408) 727-5721	Half Card	\$549	DC	Internal (IBM) 1200/300	Crosstalk
	HP Internal	\$425	DC	Internal (HP) 1200/300	-
	1200 Plus	\$499	DC	External 1200/300	-
	PC Modem 1200	\$499	DC	Internal (IBM) 1200/300	Crosstalk
Visionary Electronics 141 Parker Ave. San Francisco, CA 94118 (415) 751-8811	1200 (includes CMOS RAM and clock)	\$795	DC	External 1200/300	-
Votrax Inc. 1394 Rankin Troy, MI 48083 (313) 588-2050	DTMF Modem (analog to digital with speech synth)	\$700	DC	External Any	-
Western Datacom 5083 Market St. Youngstown, OH 44512 (216) 788-6583	Datacomm 212	\$625	DC	External 1200/300	-
	Worldcom 200	\$595	DC	External 1200/300	-
	424 Autodial	\$925	DC	Internal 2400/1200/300	-
	407 DTMF	\$595	DC	Internal adjustable	-
Westridge Communications 6913 Valjean Van Nuys, CA 91406 (818) 997-7758	Model 6420 (C64)	\$99	DC	External (cartridge) 300	AutoCom II
	Model 2050 (Timex 1000, 2608)	\$119	DC	External 300	-
	212 X LAPB 212 X.25	\$550 \$650	DC DC	Ext or Int 1200/300 Ext or Int 1200/300	-
Wolfdata 187 Billerica Rd. Chelmsford, MA 01824 (617) 250-1500	212 X LAPB 212 X.25	\$550 \$650	DC DC	Ext or Int 1200/300 Ext or Int 1200/300	-
	XE1251 Mosart XE1253 Mosart (w/speech synthesizer)	\$495 \$545	DC DC	Ext and Int 1200/300 Ext and Int (IBM PC) 1200/300	-
Xtron Computer 19 Rector St. 35th Fl. New York, NY 10006 (212) 344-6583	Mitey Mo (C64)	\$99.95	DC	External 300	Mighty Plus
Zebra Systems 78-06 Jamaica Ave. Woodhaven, NY 11421 (212) 296-2386	2050 (Timex)	\$119	DC	External 300	-
Zoom Telephonics Inc. 207 South St. Boston, MA 02111 (617) 423-4236	Networker	\$129	DC	Internal (Apple II) 300	-
	Zoom/Modem Ile	\$179	DC	External (Apple Ile) 300	-

charges and help prevent transmission errors, most telecommunications services allow access through dedicated telecommunications networks that operate local trunk lines. CompuServe, for example, operates its own network. Tymnet and Telenet, two network giants, serve most of the major services, including CompuServe and The Source.

Unfortunately, these local trunk lines are sometimes not so local. Quite often, especially in remote areas, you still incur charges because the phone number lies outside your local calling range. Also, some services charge you a premium for accessing them through other telecommunications networks. However, all things considered, going through a network is generally less expensive than calling the service direct.

And lest you forget, telecommunications services cost money. They usually charge by the hour at rates from \$2 to \$300. Before you sign up, ask for information. Most send a packet that extolls the virtues of their service and tells you the rates. For a list of the more popular services, see the sidebar.

The End of the Line

What does the future hold for telecommunications? It is difficult to say, but in "Telecommunications: The Ideal and the Reality" (February 1985 issue), Barry Keating provides a good idea of how the business professional can use a modem to improve work flow.

The possibilities for students are equally impressive. Telecommunications can replace the limitations of the local library with the virtually boundless resources of huge databases. Chances are, if you want to research a particular topic, exhaustive information is already available from one of the many services.

A growing number of people use telecommunications for leisure. You may not be able to snare a local opponent for chess at 10:00 p.m., but you can find someone across the country. Many people find new friends with the same interests through telecommunications. The CB on CompuServe and Chat on The Source are two of the most popular meeting places.

The comparison chart will help you decide which modem is right for you. Armed with the appropriate hardware and software, you too can take advantage of the speed, ease, and convenience of telecommunication to improve productivity, research topics, and just plain relax. And the best part—it is only a phone call away. ■

Axiom's Four Star Line-up of Compact Printers, Plotters and Interfaces

The Elite Family of Daisy Wheel Printers



At last, a complete range of letter quality daisy wheel printers from one manufacturer. This trio of low-cost, high-performance machines covers a wide range of applications, both for home and office. All members of our Elite Family are identically software compatible with the most popular word processing packages and a full supporting line of single and dual bin cut-sheet feeders and bidirectional tractors is available.

Check below for the Elite that best suits your needs:

Model	Print Speed	Max. Paper Width	Price
Elite-5	12 cps	11.8 inches	\$ 319
Elite-10	22 cps	13.8 inches	\$ 449
Elite-15	45 cps	16.7 inches	\$1495

Elite printers are available with Centronics parallel, RS232C, serial and a variety of Direct-Connect™ interfaces for popular computers, including Commodore and Atari.

The Amazing Penman Three-Pen Plotter



Great things often come in small packages. A case in point is our unique 3-pen robot plotter that propels itself over any size paper up to 3 ft. by 3 ft. to produce high quality, multi-color graphics. The Penman robot draws straight lines and circles without any "staircase" effect. It responds to a high level command set, including ASCII characters, which may be printed as small as 1 mm high.

Unlike other plotters, Penman does not restrict you to any particular size or shape of paper. Optical sensors in the robot plotter search for the corner of the paper and Penman produces high quality graphics, referenced to this point.

Penman is perfect for business graphics, signs, charts, schematics and connects to any computer with an RS232C serial interface. Software is available to plot from popular spread-sheet programs, including LOTUS 123.

Priced at only \$399, this amazing little plotter brings graphics well within the reach of any personal computer user.

The SLP - A Revolutionary Miniature Dot Matrix Printer



A major breakthrough in printing technology! Our SLP (Super Little Printer) has superb print quality, yet is so small that it fits in a desk drawer or a busy executive's briefcase.

The SLP has a unique 'Focal Plane' printhead which uses completely straight print wires rather than the less accurate curved type in other printers. The result is an NLQ print mode that is of unbelievably high quality.

Other features include a higher speed draft mode, subscript, superscript, underlining, dot addressable and IBM-PC compatible graphics, an easy-load ribbon cartridge, quiet operation, detachable tractors (a low cost option) and a choice of parallel, serial or Commodore Direct-Connect interfaces.

With list prices from \$299, it's no wonder the SLP was top rated in a recent P.C. Magazine survey.

ParallAx Interfaces for Atari, TI and Commodore



Axiom's line of Expansion Interfaces makes it easy to connect any parallel input printer to Commodore, Atari and TI computers.

The ParallAx-CD graphic interface is compatible with all Commodore computers including C/64, Plus-4, Executive and new models. It has a true 1525 emulation mode for all popular dot matrix printers, assuring 100% software compatibility.

ParallAx-AT is compatible with all Atari computers including XL series and the new 65XE model. It is a compact, well proven printer interface and is guaranteed to work with your parallel-input printer.

ParallAx-TI plugs directly into the side of the TI 99/4A computer, eliminating the need for the bulky TI expansion box to connect to a parallel-input printer. All TI 'sidecar' expansion units may be daisy-chained through ParallAx-TI without loss of performance.

Prices for ParallAx interfaces are from \$89.00

AXIOM®
AXIOM CORPORATION

1014 Griswold Avenue • San Fernando, California 91340 • Telephone (818) 365-9521 • TWX 910-496-1746

CIRCLE 102 ON READER SERVICE CARD

Compaq Deskpro

Ver

Which is right for you?

Tom Badgett

The Compaq Deskpro—affectionately called the “Texas AT” in some circles—provides heavy competition for the PC AT. This impressive hunk of iron isn’t quite as high tech as the AT with its 80286 processor and 16-bit bus, but the Deskpro’s 7 MHz 8086 and options give it good performance that stacks up especially well when the AT is unavailable.

The Deskpro is about a year old, and Compaq says sales are “superb.” That wasn’t the case in the fall when Compaq’s thunder was muted by IBM’s AT announcement. It seemed that even those users and dealers who hailed the Deskpro as a welcome addition to the PC compatible stable were wowed by the AT. The Deskpro fell on temporary hard times as the spotlight played on the AT.

Why AT?

There are at least four reasons for this attention. The first three are I, B, M. The fourth reason: the PC AT really is awesome. It is a big, fast, powerful micro with a lot of guts at an impressive price. The AT runs about two-and-a-half times as fast as the PC XT, thanks to its 6 MHz, true 16-bit, 80286 CPU. Hard disk storage can go to 40Mb. An improved keyboard, front panel keylock, up to 3Mb of RAM, and an onboard clock/calendar with battery backup round out the package.

The PC AT is offered in two basic configurations: The Model 68, a 256K floppy-based machine and the Model 99 with 512K, a 20Mb hard disk, and a serial/parallel I/O card. Options available from IBM include: memory expansion cards and chips, an additional 20Mb hard disk, 40-track floppy drive, math co-processor, various communications adapter cards, floor standing enclosure, and a tilt and swivel stand for the display monitor.



Hardware Profile

Name: Compaq Deskpro **Type:** Desktop IBM-compatible computer

CPU: 8086 at 7.1 MHz **RAM:** 128K Standard. As Tested: 640K

Operating System: MS DOS V. 2.11 **Keyboard:** Detached, 83-key, rubber dome

Ports: Graphics/text to amber or green 12" monitor; RGB color; composite color or monochrome; RF modulator output; Centronics parallel printer interface; RS-232 w/clock and calendar (with models 3 and 4)

Display: 320 x 200 and 640 x 200 IBM compatible graphics and text; Green or amber monitor included with all units

Documentation: Quality soft-cover manuals. Good illustrations. Easy to follow

Summary: A fast, quality, PC compatible machine. Easy to use. Competitively priced

Price: Model 1: \$2495

Model 2: \$2995

Model 3: \$4995

Model 4: \$7195

As tested with 30Mb drive: \$8500

Manufacturer: Compaq Computer Corporation

20333 FM 149

Houston, TX 77070

(713) 370-7040

CIRCLE 401 ON READER SERVICE CARD

sus IBM PC AT



Hardware Profile

Name: IBM PC AT **Type:** Desktop computer **CPU:** 80286 at 6 MHz

RAM: 256K standard **Operating System:** PC DOS V. 3.0

Keyboard: Detached 84-key, spring technology. Some keys relocated from standard IBM PC

Ports: Color graphics or monochrome display adapter; Centronics Parallel printer port; RS-232 port on enhanced model

Display: Standard IBM PC color graphics or monochrome adapter; color or monochrome monitor, extra

Documentation: Typical IBM

Summary: A fast, well-designed, state-of-the-art computer. Pleasant to look at; easy to use

Price: Basic unit with 1.2 Mb floppy: \$3995

Enhanced (20Mb, 512K, serial port): \$5795

Manufacturer: IBM Entry Systems Division

P.O. Box 1328

Boca Raton, FL 33432

(800) 426-3333

CIRCLE 402 ON READER SERVICE CARD

Or Deskpro?

The Deskpro specs are equally impressive. Its 16-bit 8086 processor normally runs at just over 7 MHz and executes most CPU-intensive tasks about twice as fast as a standard IBM PC. The Deskpro comes in four basic configurations, each of which can be customized.

The model 1 is the basic unit, with 128K of RAM, a single disk drive, and either a green or amber 12" monitor.

The model 2 adds a second disk drive and 128K of RAM to the basic setup.

The model 3 has a 10Mb fixed disk and a clock/calendar/RS-232 board.

The model 4 adds a 10Mb tape cartridge backup unit and another 384K of RAM to the model 3.

You can expand any of the models to 640K of RAM on the motherboard. Other options include a clock/calendar/RS-232 board (standard on models 3 and 4), tilt-swivel monitor stand, and a 30Mb fixed disk. There are no official Compaq display adapter options because, like the earlier Portable, the Deskpro incorporates both graphics and text displays into the same card. Color attributes are displayed on the green or amber screen as shades of variable intensity. Composite video, RF modulator, and RGB monitor outputs are standard equipment on all Deskpro models. Apparently, any third-party PC or PC/XT expansion card that works properly with the IBM machines will function with the Deskpro, expanding greatly the optional configurations possible with the machine. The Deskpro appears to be completely IBM compatible. All of the software we tried on it ran properly.

"We're more compatible with IBM than IBM," quipped Compaq spokesman Ken Price, apparently referring to compatibility problems some users are having with software and hardware products on the AT. In a few instances, products that don't "follow the rules" explicitly don't always run on the AT.

More Comparisons

Both Compaq and IBM have come up with winning successors to their basic machines. Both originals were winners, too. Some people chose the IBM PC for the name, the larger screen, or the keyboard. Others chose the Compaq for its size, portability, integrated text/graphics display, or keyboard. Similar choices are being made between the AT and the Deskpro.

Only from Topaz...

Line 2® Power Conditioners with PowerLogic® Control

The logical choice
in computer-grade
power

They're in a class by themselves.

Highly efficient and completely reliable, these microcomputer-based Line 2 Power Conditioners eliminate computer problems caused by power-line noise and voltage disturbances.

With exclusive Powerlogic control, our Power Conditioners are able to perform with exceptional speed and accuracy. An internal microcomputer monitors incoming power and instantaneously corrects overvoltages and undervoltages.

Harmful power-line noise is also eliminated. A built-in Ultra-Isolator® Noise Suppressor provides common-mode noise attenuation in excess of 2 million-to-one (126 dB).

Available in micro, mini, and mainframe models, Line 2 Power Conditioners feature computer-compatible design, durability and top performance.

Find out more about our new Line 2 Power Conditioners. Call us today at (619) 279-0831, or contact your local Square D distributor.



TOPAZ®

Excellence in Computer Power

SQUARE D COMPANY

CIRCLE 161 ON READER SERVICE CARD

Really, they are different machines, aimed at different audiences. The Deskpro is a faster, somewhat more powerful successor to the original Compaq Portable, and thus the PC and XT. The AT is that too, of course, but it also was conceived as a Xenix engine for multiuser and multitasking applications, and as a network server.

System Considerations

The 80286 CPU of the AT can address 16Mb of memory directly and one gigabyte of virtual memory using a built-in memory management capability. The CPU also has a built-in memory protection unit to keep multi-users from interfering with one another.

To make use of the multi-user, multi-tasking abilities of the AT, IBM is depending on Xenix, a licensed derivation of AT&T's Unix distributed by Microsoft. This operating system is a multiuser, multitasking operating system that fully exploits the 80286. Software applications from the Unix world presumably could be brought up on the AT relatively easily. The real question is whether IBM will fully support the AT as a multiuser machine, and whether the user community is committed enough to Xenix to make it fly.

DOS 3.0 is the standard operating system for the AT. It is a patchwork upgrade of DOS 2.x—probably the last practical one without a major rewrite. It uses at least 12K more RAM than DOS 2.1, but it has some useful enhancements that obviously lean toward multiuser and network applications:

- Rudimentary file sharing.
- Block locking to restrict access to whole or portions of a file.
- Background printing that supports path and internal program calls.
- New DOS function calls for improved file management.
- VDISK program that uses RAM disk memory above 1Mb.
- Enhanced GRAPHICS screen dump utility for better printer support.

The 8086 CPU of the Deskpro lacks some of the sizzle of the 80286, but it is no slouch. It is a more powerful companion to the 8088 of the PC and XT. The difference between the two is that the 8088 can handle data in 8-bit chunks, while the 8086 can move things two bytes at a time. It is a true 16-bit processor. Both chips can address up to 1Mb of memory and could operate with a system clock speed of 8 MHz. IBM's PC, however, has a clock speed of 4.77 MHz. The Deskpro 8086 operates at 7.1 MHz. The

faster system speed coupled with its ability to move data two bytes wide makes for a quick CPU. It isn't as fast in CPU-intensive operations as the AT, but the difference is small—about 25% according to Compaq. Tests with Basic timing loops and prime number generators support that claim.

Compaq says if both units have math coprocessors the Deskpro is faster than the AT. We didn't have access to the math chips to test that one. The Deskpro is more than twice as fast as the PC XT. A keyboard "soft switch" will slow down the system clock to a fully compatible 4.77 MHz to accommodate software that uses software timing loops or has other requirements for the IBM compatible clock. A front-panel LED glows red in this "common" or slowed down condition. When things are running at full speed, the LED is green.

The AT keyboard is a winner. The large Enter and Shift keys are where they belong and have word labels as well as symbols.

Comparing operations that involve disk I/O is more difficult because of the many configuration variables on the Deskpro, and a slightly slower disk read/write routine in DOS 3.0. DOS 2.11 is standard with the Deskpro, and it has some custom Compaq enhancements to handle the tape backup chores. RAM-resident Microsoft GWBasic also is part of the package. The smaller 10Mb Compaq hard disk is slower than the 20Mb IBM unit with its 40ms access time. However, the Compaq 30Mb unit we tested is as fast or faster.

Keyboards

Computer keyboards always cause a great deal of end user comment. The ones with the AT and the Deskpro are no exception.

The AT keyboard is a winner. The large Enter and Shift keys are where they belong and have word labels as well as symbols. Several keys have been moved, but you probably won't notice the change until you look for the Escape key. It is above the number keypad on the right of the keyboard. Whether this is a curse or a blessing depends on whether you use the Esc key regularly, or merely

stumble over it when you mean to press Tab. The most useful change is getting the Prtsc/* key away from the right Shift and Enter keys where you can tap it by mistake and lock up your system. A SysReq key has been added to help future Xenix users choose multitasking modules.

Other keyboard enhancements include status indicators for the Num Lock, Caps Lock, and Scroll Lock keys. The action on the new keyboard is very much the same as the old keyboard with perhaps slightly less spring pressure.

The Deskpro keyboard sticks to the original PC layout, adding LED indicators on Caps Lock and Num Lock keys. The action is drastically different. With the Deskpro, Compaq switched to rubber dome technology, abandoning the controversial double spring, two-level keys of the Portable. To long-term PC and XT users, the Deskpro keyboard will seem impossible at first. It is absolutely quiet, for one thing, and it has a soft—very soft—feel. The difference between the Compaq portable and the Deskpro is less noticeable, and if you are a regular user of the new PCjr keyboard, as I am, you'll feel right at home. The technology is the same, and the feel quite similar. I found that after a few hours on the Deskpro, my typing speed seemed to increase over my old standby Portable.

It is a comfortable keyboard and easy to get used to, but it seems strange that Compaq kept the small Return and Shift keys of the original instead of making the same changes IBM did with the AT. It probably is just another example of Compaq's driving effort to remain IBM compatible. They apparently just didn't know about the AT—or didn't know enough about it—before the Deskpro was released. One user told me he liked the Deskpro better all around, except for the "incredible, cheesy, cheap, toy-like keyboard." He bought an AT because of that one complaint. To each his own.

Disk Drives

The PC AT can have up to three internal disk drives. They can be two floppies and one hard disk or two hard disks and one floppy. The floppy disk drives come in two varieties. The standard is an 80-track, high density unit which can store 1.2Mb on special diskettes or 360K on regular media. Because this drive uses a recording head which is much smaller than that of a 40-track drive, no compatibility is claimed between the old and new drives. The slot

below the high density floppy can hold a 40-track drive to allow reliable data transfer from the AT to other computers equipped with a similar drive. The hard disks are 20Mb units with an average access time of 40 ms.

The Deskpro does IBM one better with four external storage slots. Two 360K, 40-track floppies generally occupy the top two slots. In the model 4, a 10Mb tape backup unit is in the lower left position, and a 10Mb Winchester is in the lower right. With the current popular software and hardware configurations, this seems like a much more flexible arrangement. IBM apparently felt the 1.2Mb floppy would ease some of the backup problems always present with Winchester devices. But the fact is, the disk media are costly, and, for a 20Mb drive, you must still do a lot of disk swapping to get a good backup.

The Deskpro approach maintains complete media compatibility with existing software, while providing an easy backup solution with the 10Mb streaming tape unit. The tape must be formatted once before use. That takes

about 16 minutes. After that you can back up an entire 10Mb disk in 20 minutes or less, depending on whether you do a file-by-file backup, or back up everything on the hard drive. Software utilities permit you to display a directory of the backup tape and restore from tape by named files if you wish. Even with all

The crisp Compaq video on a 12" screen is truly a joy to use.

available options installed, the Deskpro has five IBM compatible expansion slots free.

The AT uses the standard IBM PC display adapter card, with two high-resolution, and equally high priced, options available. The Deskpro stays with the excellent quality combination unit of the Portable, but with a 12" screen in either amber or green. Either display gives excellent quality. And the crisp Compaq video on a 12" screen is truly a joy to use.

Making a Choice

The tendency is to compare the IBM PC AT head-to-head with the Compaq Deskpro. That is OK, because they stack up well against each other. In reality, however, they are totally different and should be considered that way when comparison shopping. The Deskpro is a bigger, better, faster PC or Compaq Portable, while the AT is a breed apart. It uses so much new technology—and design philosophy—that it is difficult to compare it with the Deskpro or the PC and XT.

Unless you just have to have the latest CPU technology, or multiuser and networking are musts, the AT may be more machine than you and your budget need. The Deskpro, on the other hand, with its easy expandability and relatively low price, makes an excellent choice for the single user office environment. With its 30Mb disk and other options, it could even be preferable to the AT, unless raw processor speed is the driving force behind your decision making. And that seems a narrow approach to computing, at best. ■



ISOBAR... most complete computer protection!

More features to prevent errors, false printout, disc skips! Only ISOBAR has 3-way spike protection, noise suppression for RFI PLUS isolated filter banks! Individual filter banks isolate each load from other loads minimizing data errors of any kind. MOV surge suppressors arrest both common mode and differential mode surges. L/C filter network rejects radio frequency noise at any amplitude. Toroidal coils for greatest efficiency! All-metal housing.

Order toll free 1-800-662-5021

IN ILLINOIS, CALL
1-312-642-6871



Indus-Tool, 325 W. Huron, Dept. CC
Chicago, IL 60610

Send model # _____ or charge on

MasterCard or Visa Expires _____

Card no. _____

Name _____

Signature _____

Address _____

City _____

State _____ Zip _____

CIRCLE 180 ON READER SERVICE CARD

36 CREATIVE COMPUTING/MAY 1985

Model IBAR 4-6
(4 outlets,
6 ft. cord)
Only \$79.95

Model IBAR 2-6
(2 outlets,
6 ft. cord)
Only \$54.95

Model IBAR 8-15
(8 outlets,
15 ft. cord)
Only \$97.95

DOUBLES DISKETTE STORAGE SPACE! REDUCES DISKETTE COST 50%!



NIBBLE NOTCH I

Cuts Square Notch for
Apple, II, II+, Ile, Ilc, III,
Franklin & Commodore.

only \$14.95* each

NIBBLE NOTCH II

Cuts Square Notch and 1/4 inch round
"index hole." For use with computers other
than those shown for NIBBLE NOTCH I

only \$21.90* each

DISK OPTIMIZER SYSTEM

Software for Apple, II, II+, Ile, III and Franklin

- Certifies your "new" Disk 100% Error Free
- 469% FASTER THAN SIMILAR PROGRAMS!
- Removes Bad Sectors
- Adds 36th Track
- Performs Disk Drive Speed Check
- Adds DOS and More

only \$24.95*

SPECIAL PACKAGE PRICE — NIBBLE NOTCH I and DISK OPTIMIZER

only \$29.95 for BOTH*

* On all orders add \$2.00 for each item Postage & Handling (\$5.00 each foreign P&H)

*Florida Residents Add 5% Sales Tax

SATISFACTION GUARANTEED OR YOUR MONEY BACK!

ORDER TODAY!

Toll Free 1-800-642-2536

Florida 305-493-8355

or send Check or Money Order to:

NIBBLE NOTCH® COMPUTER PRODUCTS
4211 NW 75th TERRACE • DEPT. 54 • LAUDERHILL, FL 33319



CIRCLE 118 ON READER SERVICE CARD

IF ANY 3M, MAXELL, OR DY'SAN FLOPPY DISK FAILS, WE'LL REPLACE IT WITH A NEW VERBATIM® DISK. FREE.

Most floppy disks come with a guarantee; if they ever fail, the manufacturer will send you a brand new one. But let's face it; if a particular brand of floppy disk ever loses your data, you might not want another one of theirs.

That's why Verbatim is offering a very special guarantee: If you buy a 3M, Maxell, or Dysan floppy disk — and it fails — we will replace it with a brand new Verbatim disk. Free. Why are we making this offer? Because we think it's time you use a floppy disk you can always count on.

Verbatim.



© 1985 Verbatim Corporation

VERBATIM. YOU CAN COUNT ON US.

Mail your failed 8", 5 1/4", or 3 1/2" disk in its original envelope, along with your name and address, and the brand and model of your computer system, to: Verbatim Offer, P.O. Box 7306, Clinton, IA 52736. Limit one refund per name and address. Offer limited to the first 100,000 3M, Maxell, or Dysan failed disks received. Offer expires October 1, 1985. Void where prohibited by law. Offer rights are not assignable or transferable.

CIRCLE 133 ON READER SERVICE CARD

**SAVE
UP TO 51%**

Book Sale for Educators

Computers In Mathematics: A Sourcebook of Ideas

Edited by David H. Ahl, 8 1/2" x 11", softcover, 224 pages, \$15.95.

Contains a rich supply of classroom tested ideas for using the computer in mathematics instruction. Contains sections on problem solving techniques, graphing, simulations, regression analysis, probability, functions, magic squares, and differential equations. Every item discussed has a complete explanation including flowchart, program listing, and sample run.

Computers In Science and Social Studies

Edited by David H. Ahl, 8 1/2" x 11", softcover, 198 pages, \$14.95.

This diverse collection of 49 computer simulations and applications is a valuable source of ideas to make learning more realistic and more fun. Social simulations let you manage a kingdom, trade furs, or run an oil company. Explore various ecosystems, land a lunar capsule, fire a cannon, and analyze your health. Contains complete Basic listings and runs.

LOGO: An Introduction

By J. Dale Burnett, 11" x 8 1/2", softcover, 72 pages, \$7.95.

This book is a tutorial for students and teachers who want to learn about Logo. You will learn to create geometric shapes, spirals, curves, and drawings. The book shows how to use shapes to create elaborate drawings with rotation, progression, and recursion; it also introduces Logo logic and calculations.

Be A Computer Literate

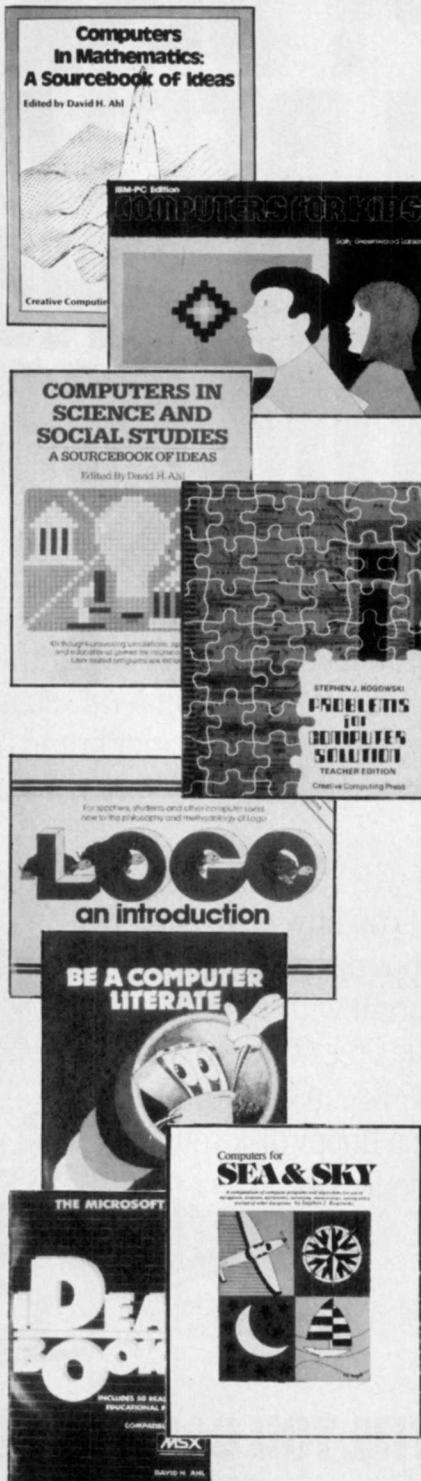
By Marion J. Ball and Sylvia Sharp, 8 1/2" x 11", softcover, 61 pages, \$6.95.

This lavishly illustrated introductory book explains the parts of a computer, how they work, how a program is constructed, and applications of the computer in business and industry. A glossary covers essential computer terminology. Many school systems use this book in computer literacy classes.

The Microsoft Basic Ideabook

By David H. Ahl, 5 1/2" x 8 1/2", softcover, 144 pages, \$8.95.

This book contains 50 tested, ready-to-run Basic programs which demonstrate many different techniques for solving problems in mathematics, science, and business. The book covers repetitive trials, convergence, recursion, compounding, probability, geometry, science, simulations, and drill and practice.



Computers For Kids

By Sally Larsen, 11" x 8 1/2", softcover, 75 pages, \$6.95.

Large, easy-to-read type and entertaining illustrations make this a wonderful tool to teach children about computers and programming. Contains complete instructions for writing programs that print, draw, and do calculations. Includes a special section for parents and teachers. Specify edition: Apple, C64, TRS-80, Atari, IBM PC.

Problems For Computer Solution

By Stephen Rogowski, 8 1/2" x 11", two vols (teacher and student), softcover, 288 pages, \$14.90.

Ninety problems are presented with complete discussions and solutions in many areas: algebra, geometry, number theory, probability, statistics, calculus, and science. Several classic unsolved problems are included to help sharpen students' insight and awareness. Teacher's edition contains complete solutions, programs, and sample runs.

Computers For Sea and Sky

By Stephen Rogowski, 8 1/2" x 11", softcover, 108 pages, \$9.95.

This book contains a comprehensive description of the principles of navigation for ships and planes. Includes programs for celestial navigation, meteorology, surveying, astronomy, and many other related subjects.

How To Get Your Discount

Buy any one book for the regular price plus \$2.00 shipping and handling. Buy any two or three books and you get a 10% discount. Buy any four books and you get a 20% discount. Any five, 30% off. Any six, 40% off. Any seven, 50% off. On multiple book orders, shipping and handling costs \$3.00. However, if you buy all eight books ("Educators Super Special") the price is just \$45.00 and WE pay the shipping and handling! That's a 57% discount off our regular price!

To order, send your check for the amount of the books less your discount plus postage and handling (\$2.00 for one book, \$3.00 for two or more) to Creative Computing Press, Morris Plains, NJ 07950. Visa, MasterCard, and American Express orders may be called in toll-free to 800-631-8112 (in NJ 201-540-0445). School purchase orders must add an additional \$2.00 billing fee.

Don't put it off. Add these valuable books to your library today at a substantial discount.

Creative Computing Press

Morris Plains, NJ 07950
Toll-free 800-631-8112
(In NJ 201-540-0445)

Daisywheel keep on turning

Juki 6300

Owen Linzmayer

Sacrifice is essential in the selection of any major purchase, but it is especially true of computer printers. If you buy a dot matrix printer, you sacrifice letter quality output for a variety of easily accessible type modes and dot-addressable graphics. On the other hand, if you purchase a typical daisywheel printer, you get fully-formed characters but sacrifice considerable print speed. Less so today. The Juki 6300 is a \$995 daisywheel printer with an impressive output of 40 characters per second (a typical \$600 daisywheel prints 15 to 25 cps) and limited graphics capabilities.

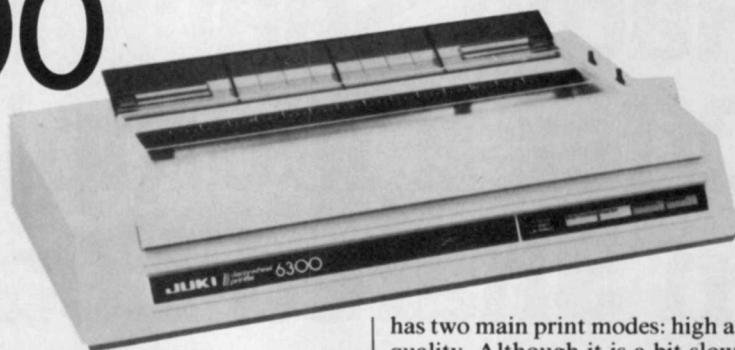
The Juki 6300 is a sister model to the popular \$599 Juki 6100 printer. Designed to meet the heavier demands of larger businesses, the 6300 zips along at 40 cps and can accept four-part forms up to 16 inches wide.

Physically, the Juki 6300 is a well-built printer that weighs less than 33 pounds. The hinged cover of the 6300 tilts up and pops off to allow access to a bank of DIP switches which control a number of printer options (pica, elite, micro, and proportional pitches). Not only are these switches easy to get to, they are labeled too! A second set of DIP switches used to select one of eight international character sets is located on the back of the unit.

Internally, the 6300 is insulated with foam to reduce operating noise. When printing, the unit emits 60dB, which is very quiet for a daisywheel—it sounds muffled, like a jackhammer being used several blocks down the street. While sitting idle the 6300 is as silent as a church mouse.

Measuring 23.6" x 15.7" x 4.9", the cream-colored Juki 6300 has a footprint slightly larger than an IBM PC. In this world of limited table space, it is a shame that the 6300 doesn't have a slot to accept paper through the bottom of the unit. While we are on the subject, the 6300 uses friction feed to advance paper, though tractor and sheet feeders are available as optional attachments. Unlike many friction feed printers, the 6300 doesn't skew continuous fan-fold paper once it is inserted correctly.

Set up of the 6300 couldn't be less



painful. Not only does the User's Manual provide information on connecting the printer to your computer, it also

Hardware Profile

Name: Juki 6300
Type: 96-character daisywheel
Feed: Friction (tractor and sheet feeder optional)
Speed: 40 cps
Interface: Parallel (serial optional)
Graphics: Limited
Character Sets: 7 optional Diablo daisywheels
Buffer: 3K (expandable to 15K)
Logic Seek: Yes, bidirectional
Summary: A quick and quiet daisywheel
Price: \$995
Manufacturer: Juki Office Machines Corp.
 1261 Wiley Road - Suite B
 Schaumburg, IL 60195
 (312) 843-3322

shows you how to use the printer via Basic commands and commercial software packages such as *VisiCalc*, *WordStar*, *Multimate*, *Lotus 1-2-3*, and *AppleWriter II*. This is the kind of attention to detail that is worth paying extra for.

Even though it has only 96 characters on its Diablo printwheel, the Juki 6300 has several different text modes. Selectable through the setting of DIP switches or via software are three pitches that provide from 10 to 15 characters per inch. The manual makes reference to a boldface mode, in which the printer strikes each character twice, but when using a single-strike film ribbon this has no noticeable effect. However, the shadow print mode advances the printhead one horizontal increment and then strikes the second character slightly to the right of the first impression, leaving what I consider a true boldface character.

It should be noted that the Juki 6300

has two main print modes: high and low quality. Although it is a bit slower, the high quality mode offers precise alignment and registration. Frankly, I find the difference between the two negligible, so I usually opt for the quicker low quality mode. The final text output features available through the use of escape sequences are sub- and superscript characters (see sample printout).

In the first paragraph of this review I said that the Juki 6300 has limited graphics capabilities. For those of you who read with disbelief, here is the explanation. As far as the manufacturer is concerned, the fact that the Juki 6300

Juki 6300
 Daisywheel
 Standard Print
 Non-Proportional
 Proportional
 Shadow Print
 Sub Script

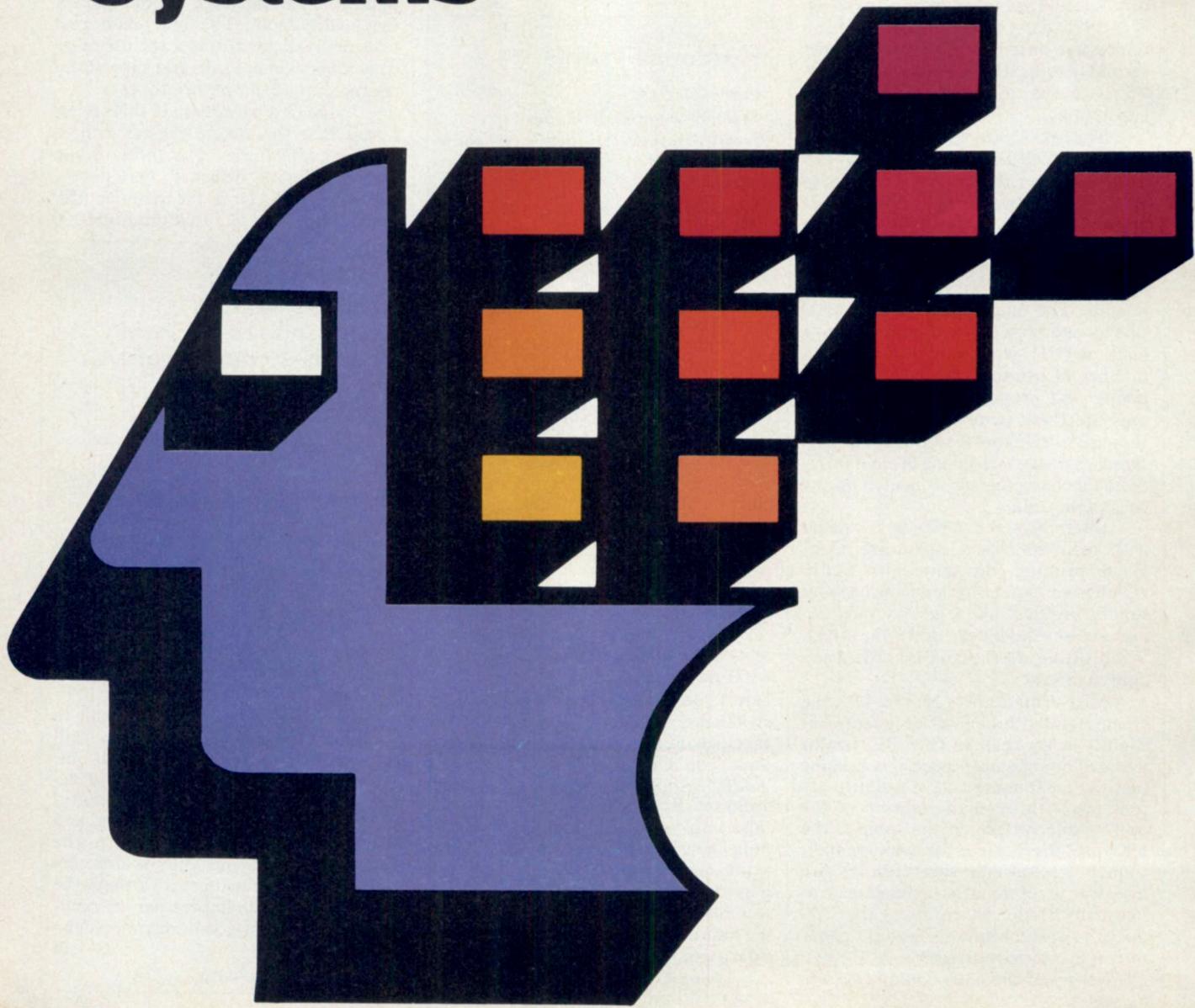
Juki Model 6300 sample printout.

has precise paper handling (1/96 inch minimum) capabilities allows it to be used to create graphics, presumably with the period character. As far as the typical user is concerned, without the custom software required to use the 6300 in this fashion, you can forget about getting graphics on a daisywheel printer.

The 6300 is designed for small to medium size businesses, and is overkill (i.e., expensive) for home applications. However, if you are looking for a dependable (backed by 90-day warranty) daisywheel printer that is both fast and relatively quiet, an introduction to the Juki 6300 could end your search. Its sleek good looks will get it through the front door, and its impressive personality will make it a welcome member of the family. ■

CIRCLE 404 ON READER SERVICE CARD

Radio Shack Networks Offer a Multiple Choice in Shared Learning Systems



Radio Shack's shared learning systems give you a choice when you're building a computer system for the classroom.

Whether you're looking for a cassette-based system for a few students, or a powerful floppy or hard disk system for more than 60 students, Radio Shack's Education Division has the right equipment for your needs.

And only Radio Shack backs up its educational computer hardware and software with the unmatched commitment to education of our parent company: the Tandy Corporation.



NETWORK 2

Bring as many as 16 student stations into a single educational network with our Network 2 Controller (26-1211, \$499.00).

Network 2 lets you use a host computer system to load a program to all 16 student stations simultaneously through the cassette port. Students can send programs they've written to the host computer one at a time for storage. With an optional printer attached to the host system, the programs can be printed out.

The Network 2 Controller works with Model I/III/4 or Color Computer or Model 100 systems, and additional Controllers can be cascaded to make larger shared systems.



NETWORK 3

A Network 3 Controller (26-1212, \$599.00) allows as many as 16 student stations to independently access lessons stored on the host computer system, so the teacher is freed from repeatedly loading individual programs.

With a Network 3 Controller, students can access the host computer's disk drives and printer for storage and printing without teacher assistance. And Network 3 learning systems are supported by the best in educational software, including the Philadelphia Computer Assisted Reading Development Program, Network Pascal, primary and secondary math and science programs, educational games and more. You can even use Network 3 systems with programs you develop using our easy-to-learn AUTHOR I authoring system.

The Network 3 learning system requires Controller, Network 3 Operating Software, a Model III/4 host and Model III/4 student stations. Optional use of a hard disk and hard disk operating software offer greater speed and flexibility.



NETWORK 4

Our Network 4 learning system uses advanced networking technology to bring as many as 63 student stations into a powerful hard disk system.

Students working at Model III/4 stations in the system have access to hard disk files. Each station operates virtually as a stand-alone system, with quick access to sets of programs and data files. Students can also access an optional printer, connected to the host, without teacher assistance.

The Network 4 learning system requires Model III/4 stations, each with a Network 4 upgrade; a host 64K Model 4; a hard disk drive; cables and operating software.

Only Radio Shack offers educators the assistance of full-time computer professionals, trained in the latest in classroom computing, located across the country for your convenience.

For the name of the Regional Educational Coordinator in your area, call 800-433-5682, toll free. In Texas, call 800-772-8538.

Radio Shack®
The Name in Classroom Computing™
A DIVISION OF TANDY CORPORATION

For information on educational products and services, mail to:

Radio Shack, Dept. 85-A-652
300 One Tandy Center, Fort Worth, Texas 76102

Name _____

School _____

Address _____

City _____

State _____ Zip _____

Telephone _____

Sharp RGB color to go

ISM Express

Russ Lockwood

In the microcomputer market, desktop computers have a distinct advantage over transportable computers: color. Somehow, graphs, charts, and diagrams look better in color. Monochrome graphics, although better than no graphics at all, pale before the power of color.

Most transportable computer manufacturers are farsighted enough to pick a graphics board that allows you to attach a color monitor. Yet when you gain color, you lose portability.

International Systems Marketing (ISM) offers the Express, a computer that bridges the gap between color and portability. It packs a 9" RGB monitor and IBM PC compatibility into one neat unit.

Electronic Frankenstein

The ISM sales representative likes to draw a parallel between ISM and IBM. He notes that when IBM sells you a computer, it is really a collection of components from several manufacturers.

When you buy an ISM Express, you are buying Shugart disk drives, a Faraday motherboard with an Intel microprocessor, a Plantronics graphics board, Key Tronic keyboard, and a Sony color monitor. All of these components are solid and dependable and manufactured by name companies in the industry. In a sense, ISM combines top-of-the-line OEM products under one cover.

ISM uses the standard 4.77 MHz 8088 microprocessor, gives you 256K RAM expandable to 640K, and includes five expansion slots for IBM PC compatible expansion boards. Two of the slots are occupied by a color graphics display adapter and a drive controller board. Two half-height floppy drives, or one floppy drive and a hard disk drive (10Mb and 20Mb versions available) provide storage. Room is available to install a third device—floppy, Winchester, or tape backup. Two RS-232 serial ports and one parallel port provide connections to the outside world.

The 9" RGB color monitor in our evaluation unit is actually manufactured by Panasonic. As you might guess, the



Hardware Profile

Name: ISM Express **Type:** Transportable business computer

CPU: 16-bit 8088 4.77 MHz **RAM:** 256K (expandable to 640K)

ROM: 8K (expandable to 32K) **Keyboard:** Detachable, 83 keys, slant adjustable

Display: 80 x 25 characters; 320 x 200 pixels (four colors)

Disk drives: Two 360K 5.25" floppy drives or one floppy drive and one 10Mb or 20Mb Winchester

Ports: Two RS-232C serial and one parallel **Dimensions:** 18" x 20" x 8.5"

Weight: 3.5 lbs. **Operating System:** MS-DOS

Documentation: ISM Technical Reference manual

Summary: A quality IBM PC compatible offers portability and a superb built-in 9" RGB color monitor with an astounding 0.25mm dot pitch

Price: \$3195; with 10Mb Winchester, \$4695; with 20Mb Winchester, \$4995

Manufacturer: International Systems Marketing

932 Hungerford Dr., Suite 6

Rockville, MD 20850

(301) 279-5775

GET SERIOUS!

CHECK OUR LOW PRICES NOW

Table 1. Ahl's Benchmark test.

	Time	Accuracy	Random
IBM PC	24 seconds	0.01159668	6.3
Express	17 seconds	0.00585938	7.2

resolution is very sharp. Take a look at the screen display to see what we mean. Text resolution is 25 lines of 80 characters, and graphics resolution is 320 x 200 pixels in four colors. The optional Plantronics graphics board supplied with our evaluation unit provides 16 colors, making the monitor look even better.

However, ISM is switching monitor manufacturers and will install Sony monitors with an even sharper resolution. Most RGB monitors have a dot pitch of 0.31mm to 0.43mm (see the Buyer's Guide to RGB Monitors in our February 1984 issue for a full explanation of the finer points of RGB monitors). The dot pitch on the Sony monitor is a super sharp 0.25mm.

ISM thoughtfully places the on/off switch on the front of the machine and includes a handy reset switch. The Key Tronic keyboard plugs into the side of the unit rather than the back, increasing keyboard mobility and user comfort.

The Key Tronic keyboard (Model KB5150) corrects several of the shortcomings of the IBM PC keyboard. It features reversed Shift and Backslash keys; English labels instead of arrows on the Backspace, Return, Tab, and Shift keys; raised bumps on the J, F, and 5 keys; LEDs on the Num Lock and Caps Lock keys; a horizontal Return key; and a separate Return key on the numeric keypad. The tactile feedback is good, and the keystrokes are very quiet, eliminating the pronounced clicks of the IBM PC keyboard.

We ran Ahl's Simple Benchmark (see July 1984 issue for a complete explanation) on the Express. The results are shown in Table 1.

Software

In the tradition of IBM PC compatible computer manufacturers, ISM claims the Express is highly compatible with the IBM PC and runs most off-the-shelf PC software. To make a long boast short, ISM is correct.

The de facto standards of IBM PC compatibility are *Lotus 1-2-3* and *Microsoft Flight Simulator*. The Express ran both without a problem. Next, we tried several other packages, from business to education to entertainment. Even the tough, copy protected programs ran

perfectly. Give ISM credit; the Express acts like an IBM PC.

Advanced Basic was the only IBM product we could not load and run. Evidently, the Express only accepts GW Basic, the standard Basic bundled with IBM PC compatibles. Some Basic programs written specifically for Advanced Basic may not run using GW Basic.

Thus, we offer our now-standard line regarding compatibles: try the software before you buy the hardware. Based on the *Lotus 1-2-3* and *Microsoft Flight Simulator* tests, we feel confident that the Express will run most software.

Pricing

ISM offers three configurations of the Express. All models include 256K RAM, color monitor, graphics board, built-in serial and parallel ports, and MS-DOS 2.0.

The Express PC, with two 360K double sided, double density floppy drives, retails for \$3195. The Express XT-10, with one floppy drive and one 10Mb hard disk drive, sells for \$4695. The Express XT-20, with one floppy drive and one 20Mb hard disk drive, retails for \$4995.

To Go or to Stay?

ISM manufactures an excellent IBM PC compatible. The Express combines terrific IBM PC compatibility, a sharp RGB color monitor, and several extras like a reset button and an extra serial port in one transportable unit.

Of course, what we have not mentioned yet is the weight. At 35 pounds, the Express is likely to beef up your biceps—if you do not separate your shoulders first. We think the hand strap needs a thicker padding—we like circulation to our fingers as we carry the computer.

All things considered, however, we are enthusiastic about the ISM Express. ISM is too. They are opening a new manufacturing plant (perhaps we should call it an assembly line) to increase production and erase the backlog of orders. If you are an executive or professional looking for transportability, PC compatibility, and the glory of color, take a look at the ISM Express. The color and resolution are sure to impress you. ■

CIRCLE 403 ON READER SERVICE CARD

*** TAX RETURN SPECIAL ***
LOTUS 1-2-3 \$285.00

* SYSTEMS *

IBM PC-256K
Two TEAC 360K Dr's, Color/Monochrome Graphics Board, Parallel Printer Port, Taxan Monochrome Display, DOS 2.1. ONLY \$2,145.00
IBM PC-256K
Two TEAC 360K Dr's, Color/Monochrome Graphics Board, AST 6-Pak Plus 64K, PRINCETON HX-12 Color Display, PANASONIC 1091 Printer, LOTUS 1-2-3, DOS 2.1. ONLY \$3,320.00
10 Meg Upgrade \$680.00

* SOFTWARE *

LOTUS Symphony	\$445.00
dBASE III	349.00
Wordstar Prof. Pack for IBM	299.00
ASCII Express for IBM Framework	109.00
MICROSOFT Word	349.00
MICROSOFT Multiplan	229.00
PFS Write/File/Report	129.00

* HARDWARE *

AST Six Pack Plus 64K	\$264.00
STB Rio Plus II 64K	249.00
STB Color/Monochrome Graphics	269.00
STB Monochrome Board	169.00
HERCULES Monochrome Graphics	329.00
HERCULES Color Card	179.00
TEAC 55B ½ Height Dr's	129.00
TANDON TM100-2 Dr	169.00

* PRINTERS DOT MATRIX *

PANASONIC 1091	\$289.00
PANASONIC 1092	395.00
EPSON FX-80*	395.00
EPSON FX-100+	644.00
OKIDATA 92P	389.00
BROTHER 2024	995.00

* PRINTERS LETTER QUALITY *

BROTHER HR15	\$369.00
BROTHER HR25	609.00
BROTHER HR35	849.00
PANASONIC 3151	495.00

* MONITORS *

TAXAN 121/122 Monochrome	\$145.00
PRINCETON HX-12	469.00
PRINCETON MAX-12	179.00
ZENITH Amber/Green	85.00
NEC 1260 Green	85.00
NEC 1305 RGB/T.V.	449.00

* MODEMS *

HAYES 1200B	\$399.00
HAYES Micromodem IIe	219.00
HAYES 300	199.00
ANCHOR Mark XII	239.00
PROMETHEUS Promodem 1200	324.00

* APPLE *

80 COLUMN 64K IIe only	\$99.00
80 COLUMN Card II+ only	59.00
VIDES Ultralerm	179.00
APPLEMOUSE II	125.00
ASCII Express	79.00
Z-80 Card	49.00
APRICORN Serial Card	59.00
MICROSOFT Premium IIe	269.00
MICROSOFT Multiplan	129.00
MAC MICROSOFT Multiplan	125.00
MAC MICROSOFT Basic	105.00
16K Card	49.00

Many items available. Please call for complete pricing.

714/840-2406 VISA

**CALIFORNIA
MICRO HOUSE**

16835 Algonquin Street
Huntington Beach, CA 92649

Corporate accounts welcomed, purchase orders accepted with net 30 day terms, subject to credit approval. All prices represent cash prices. All items shipped next day in factory sealed packages. We guarantee all items for 30 days. California residents please add 6% sales tax. Prices subject to change without notice.

CIRCLE 104 ON READER SERVICE CARD

The bionic word processor

WordStar 2000 Plus

Russ Lockwood

Imagine the brain trust at MicroPro figuring out how to take Stone Age *WordStar* and transform it into a Space Age word processor. Somehow, it had to revive the aging and ailing program and generate new interest—especially in the corporate and professional sectors.

Of course, we are not privy to the internal goings on at MicroPro, but the result of whatever procedure they used is an impressive, full-featured, state-of-the-art, top-of-the-line word processing system called *WordStar 2000 Plus*. And if the adjectives don't knock you off your feet, the sophistication will.

Countdown to Features

WordStar 2000 Plus includes all the features and functions you expect of a good, solid word processing program: insert, delete, block operations, search and replace, file merge, boldface, underlining, super- and subscripts, justification, centering, adjustable margins, and full cursor movement. However, MicroPro cuts back on the cumbersome Control codes used in *WordStar* in favor of a combination of Control, Alternate, Shift, and Function keys.

This can be a two-edged sword. New users will be thrilled by the ease of invoking these functions. A plastic template that fits over the keyboard, tear-out quick reference cards, and on-screen menus help you navigate through the program. Extensive, interactive tutorials teach you the system.

Veteran *WordStar* users who have mastered the Control characters will find these new combinations baffling. Some overlap occurs between *WordStar* and *WordStar 2000 Plus*, but not enough to make the transition smooth. To the credit of MicroPro, the commands are more logical to first time users, but not to those of us who load the control codes into "Brain RAM" while *WordStar* loads into "Computer RAM."

WordStar 2000 Plus includes pre-formatted and user-definable page styles. Default settings include tabs, margins, headers, footers, and more. If you use standardized formats for memos, proposals, and other correspondence, this feature can save you time.

The program also allows macros—



Software Profile

Name: WordStar 2000 Plus

Type: Word processing package

System requirements: IBM PC/XT/AT or Compaq with 256K RAM for DOS 2.0/2.1 or 320K for DOS 3.0; two floppy drives or one floppy and one hard disk drive.

Format: Disk

Summary: WordStar went in for reconstructive surgery and emerged as the bionic word processor. It provides just about every feature imaginable. We strongly recommend using a hard disk drive

Price: \$595

Manufacturer: MicroPro
33 San Pablo Ave.
San Rafael, CA 94903
(415) 499-1200

single keys defined to print strings of characters. MicroPro finally found out what third-party manufacturers knew all along: these things are handy.

It also offers an Undo command. Many is the time I accidentally pressed Ctrl-Y (delete line) instead of Ctrl-T (delete word). MicroPro eliminates this and other black holes by allowing the most recently erased text to reappear.

More of the Write Stuff

In the Janaury 1985 issue, we reviewed *CorrectStar*, a marvelous spelling checker for *WordStar*. Well, guess what? *WordStar 2000 Plus* includes *CorrectStar* in the package.

WordStar 2000 Plus also does windows. You can move text (including

spreadsheet data) among up to three different documents. Furthermore, you can perform arithmetic calculations (add, subtract, multiply, and divide) on that data within the word processing program.

WordStar 2000 Plus also converts document files to ASCII and then transmits them using the telecommunications program TelMerge. Other advanced features include automatic footnoting and indexing, alphabetic and numeric sorting, and a mailing list database with mailmerge functions.

Down to Earth

The biggest drawback is disk accessing and swapping. The installation procedure alone takes approximately 30 minutes of intense disk reading and writing. As you use the program, each feature seems to require accessing or swapping the disk.

At first, MicroPro only allowed three copies to be made. The problem is, once you hit three copies, that's it. That means NO RAM DISKS. Page four of the installation guide specifically warns against RAM disks. Fortunately, cooler heads at MicroPro realized the folly of forcing floppy disk users to install the program into a RAM disk and then uninstall it after each session. Hence, the new version of *WordStar 2000 Plus* is not copy protected. Owners of the old version can request an update kit from dealers.

While *WordStar 2000 Plus* contains a cornucopia of features, the learning curve can be steep.

On the other hand, it is a powerful top-of-the-line word processing system. In fact, I can think of no better pairing than *WordStar 2000 Plus* and an IBM PC AT. Even owners of floppy disk machines can use the program by loading it into a RAM disk.

All in all, *WordStar 2000 Plus* is a welcome step forward in word processing software. MicroPro took *WordStar* and devised a remarkable new product with feature after feature. Executives and professionals: place *WordStar 2000 Plus* at the top of your word processor shopping list. ■

CIRCLE 405 ON READER SERVICE CARD



computer/electronics book club

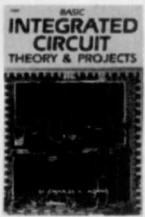
The best of both worlds!

**hands-on interfacing projects
the latest electronic applications
all from one easy-to-use source!**

**Select 5 Books
for Only \$2⁹⁵**



1640 List \$15.50 (paper)



1699 List \$19.95



1539 List \$14.95 (paper)



1394 List \$15.95



1557 List \$14.95



1722 List \$16.95



1449 List \$19.95



800 List \$19.50 (paper)



1748 List \$16.95



1492 List \$14.95



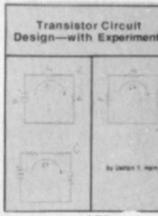
1710 List \$19.95



1650 List \$19.95



1746 List \$17.95



1875 List \$21.95



1700 List \$13.50 (paper)



1531 List \$17.95



1750 List \$19.95



1160 List \$9.95 (paper)



1553 List \$15.95



1665 List \$15.95 (paper)



1633 List \$19.95



1842 List \$22.95



1506 List \$13.95

Plus FREE For Joining →

7 very good reasons to join the computer/electronics book club

- Big Savings.** Save 20% to 75% on books sure to increase your computer and electronics know-how
- No-Risk Guarantee.** All books returnable within 10 days without obligation
- Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 13 times a year with hundreds of up-to-the-minute titles to pick from
- Automatic Order.** Do nothing and the Main selection will be shipped automatically! But . . . if you want an Alternate selection—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- Bonus Books.** Immediately get a Dividend Certificate with every book purchased and qualify for big discounts of 60% to 80%
- Extra Bonuses.** Take advantage of added-value promotions plus special discounts on software, games, and more.
- Exceptional Quality.** All books are first-rate publisher's editions selected by our Editorial Board and filled with useful up-to-the-minute information

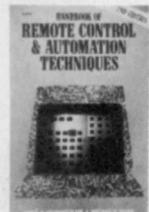
CIRCLE 129 ON READER SERVICE CARD



1753 List \$17.95



1743 List \$16.95



1777 List \$21.95

computer/electronics book club

P.O. Box 110, Blue Ridge Summit, PA 17214

Please accept my membership in the computer/electronics book club and send the 5 volumes circled below, plus my FREE copy of *Making Money With Your Microcomputer*, billing me \$2.95 plus shipping and handling charges. If not satisfied, I may return the books within ten days without obligation and have my membership cancelled. I agree to purchase 4 or more books at reduced Club prices (plus shipping/handling) during the next 12 months and may resign any time thereafter.

800 1160 1211 1394 1449 1492 1531 1539 1553
1557 1588 1633 1640 1650 1665 1672 1699 1700 1710
1722 1743 1746 1748 1750 1753 1777 1842 1875

Name _____ Phone _____

Address _____

City _____

State _____ Zip _____

Valid for new members only. Foreign applications will receive ordering instructions. Canada must remit in U.S. currency. This order subject to acceptance by the computer/electronics book club.

XCE-585

Microsoft Basic 2.0 for the Mac

Glenn A. Hart

A major obstacle to serious use of Apple's Macintosh computer has been the lack of adequate programming tools. While the "rest of us" for whom Apple tells us the machine is intended may not want to program the Mac, sophisticated Mac owners have been eager to experiment with the wonderful tools hidden inside the enigmatic little computer.

Programmers and systems houses wishing to develop software for the Mac have had to make expensive commitments to this process. The only way to produce Mac products has been to buy a Lisa computer, and costly software, and participate in the Apple development program. Apple has tantalized serious programmers with glimpses of exciting new Basic and Pascal systems, but has not yet released these products.

The only programming language available has been the Version 1 release of a Basic interpreter by Microsoft. Microsoft has written the de facto standard Basic for almost every available microcomputer, including the IBM PC, and Radio Shack, Commodore and other Apple computers, and their involvement with the Macintosh development process has been widely publicized. It was, therefore, reasonable to expect that their Mac Basic would be a worthy product.

Unfortunately, Microsoft's initial Basic was met with more negative reactions than hosannahs. While the language made some use of the special aspects of the Mac user interface, especially a multiple window approach to program entry, editing and execution, it offered only teasing and limited access to the legendary ROM routines that are advertised to make programming the Macintosh a joy. Microsoft Mac Basic Version 1 was far from a *bad* implementation, but it seemed much too much like a quick rehash of the same Basic produced by Microsoft for a slew of other machines. Perhaps it was a case of too great expectations, but the first Microsoft Basic for the Mac simply fell short of what was both expected and hoped for.

Now, many months after the initial release, and with the supposedly innovative Apple Basic *still* not available, Microsoft has released Version 2.0 of their Mac Basic. While cut from the same cloth as the initial release, Version 2 has been very significantly enhanced. Access to the Mac ROM routines is tremendously improved and, equally important, the very nature of Basic has been extended in exciting new directions. In many ways, Microsoft's \$160 Mac Basic is now among the most advanced Basic interpreters available on any microcomputer.

Mac Basic 2.0 uses multiple windows for program entry and execution.

Mac Basic 2.0 uses multiple windows for program entry and execution. A small Command Window at the bottom of the screen is used to enter commands and immediate mode statements. Program output is displayed in an Output Window, and up to two List Windows can be activated to show program listings. The sizes of the windows, like all normal Mac windows, can be changed.

The Menu Bar choices are greatly expanded over Version 1. The File menu to open, close, save and otherwise manipulate files; Edit menu to cut, paste and copy in the normal Mac fashion; and Control Menu to run, stop, continue, suspend, and list programs and toggle Trace mode are retained from Version 1. But new options like single stepping through a program (executing one Basic statement at a time and halting between each) and printing a file in a special enhanced mode have been added.

Two new Menu choices are available. A comprehensive search/replace mechanism allows finding and, optionally, replacing strings of text, including keywords. This can be a very significant productivity enhancement; some programmers have traditionally

used word processors to prepare Microsoft Basic programs just to have searching provisions available. The other new Menu option is Windows, which allows manipulation of the Command, List, and Output windows.

Two versions of the language are provided. One uses BCD (binary coded decimal) math, while the other uses the more common binary floating point math system. BCD offers complete accuracy without the rounding errors endemic to floating point binary math, and is thus much more suitable for business programs where a penny or two rounding error isn't acceptable. BCD math is much slower, however, and the accuracy of floating point is acceptable for many scientific uses, so floating point math is the norm in engineering and like disciplines. The new Basic automatically discerns which interpreter to use when loading a previously saved program. Microsoft is to be commended for providing both alternatives.

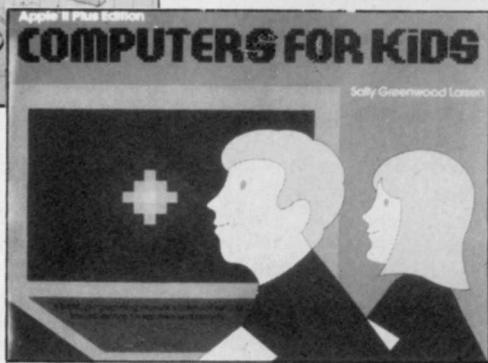
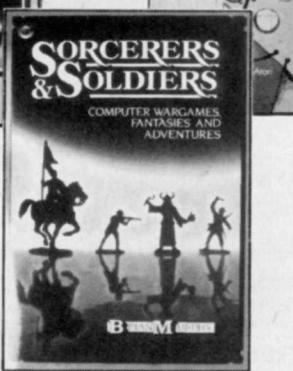
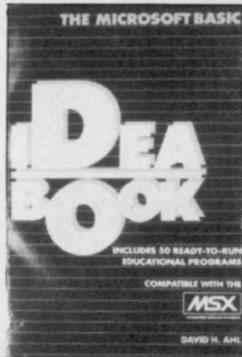
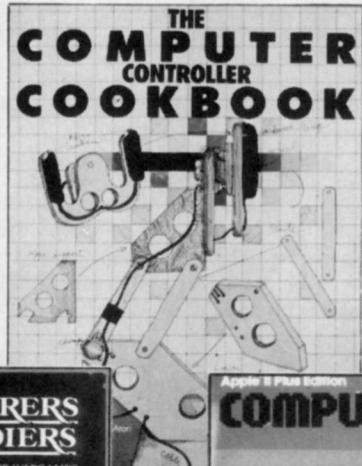
The first sample program encountered in the documentation is a shocker—not because of what it does, but because it reveals that something different and new is at hand. The program doesn't have any line numbers, and there are alphanumeric line labels here and there. Microsoft Mac Basic 2.0 has finally done away with the slavish adherence to line numbering so scorned by users of other high level languages. The new version will accept programs with line numbers for compatibility, but it obviously prefers programs without them.

The language now uses the standard Geneva typeface rather than the horrible font used in the earlier release. To improve readability further, Basic keywords are now displayed in boldface to make them stand out from user variables and strings.

Programs are entered in a list window. The editor works very much like *MacWrite*, with all the normal mouse methods—cut, paste and copy, etc. Experienced Mac users will feel right at home and be able to enter and edit program text at high speed. Microsoft encourages line indentation to clarify

UP TO
56% SAVINGS

Apple Books On Sale



The Creative Apple

Edited by Mark Pelczarski and Joe Tate, 8 1/2" x 11", softcover, 448 pages, \$16.95.

The Creative Apple is a huge 448-page compilation of Apple-oriented articles and programs from **Creative Computing** covering graphics; programming methods; educational, personal, and business applications; interfacing; in-depth hardware and software reviews; and much more. Lavishly illustrated with diagrams and screen photos.

Write Your Own Apple Games

By Stuart Anstis, 8 1/2" x 11", softcover, 174 pages, \$12.95.

This tutorial volume teaches you how to design and program your own games, puzzles, and simulations. Forty programs and routines illustrate the basics of game design including movement, scoring, graphics, time delay, and dialogue.

The Computer Controller Cookbook

By Tom and Kelda Riley, 8 1/2" x 11", softcover, 150 pages, \$12.95.

This is a complete how-to manual on building and repairing joysticks, paddles, and other controllers such as an airplane stick and foot peddle. Full-size drawings, photographs, and schematics make this tutorial especially easy to use.

Sorcerers & Soldiers

By Brian J. Murphy, 6" x 9", softcover, 240 pages, \$9.95.

Sorcerers & Soldiers is a tutorial guide to fantasy, war, and adventure games for the computer. It begins with a brief history of the field and includes descriptions of a wide variety of old and new games. Best-selling games are described and playing strategies suggested.

The Microsoft Basic Ideabook

By David H. Ahl, 5 1/2" x 8 1/2", softcover, 144 pages, \$8.95.

This book contains 50 tested, ready-to-run Basic programs which demonstrate many different techniques for solving problems in mathematics, science, and business. The book covers repetitive trials, convergence, recursion, compounding, probability, geometry, science, simulations, and drill and practice.

Computers For Kids

By Sally Larsen, 11" x 8 1/2", softcover, 75 pages, \$6.95.

Large, easy-to-read type and entertaining illustrations make this a wonderful tool to teach children about computers and programming. Contains complete instructions for writing programs that print, draw, and do calculations. Includes a special section for parents and teachers.

How To Get Your Discount

Buy any one book for the regular price plus \$2.00 shipping and handling. Buy any two books and you get a 10% discount. Buy any three books and you get a 20% discount. Any four, 30% off. Any five, 40% off. On multiple book orders, shipping and handling costs \$3.00. However, if you buy all six books ("Apple Super Special") the price is just

\$35.00 and WE pay the shipping and handling! That's a 56% discount!

To order, send your check for the amount of the books less your discount plus postage and handling (\$2.00 for one book, \$3.00 for two or more) to Creative Computing Press, Morris Plains, NJ 07950. Visa, MasterCard, and American Express orders may be called in toll-free to 800-631-8112 (in

NJ 201-540-0445). No orders can be billed.

Don't put it off. Add these valuable books to your library today at a substantial discount.

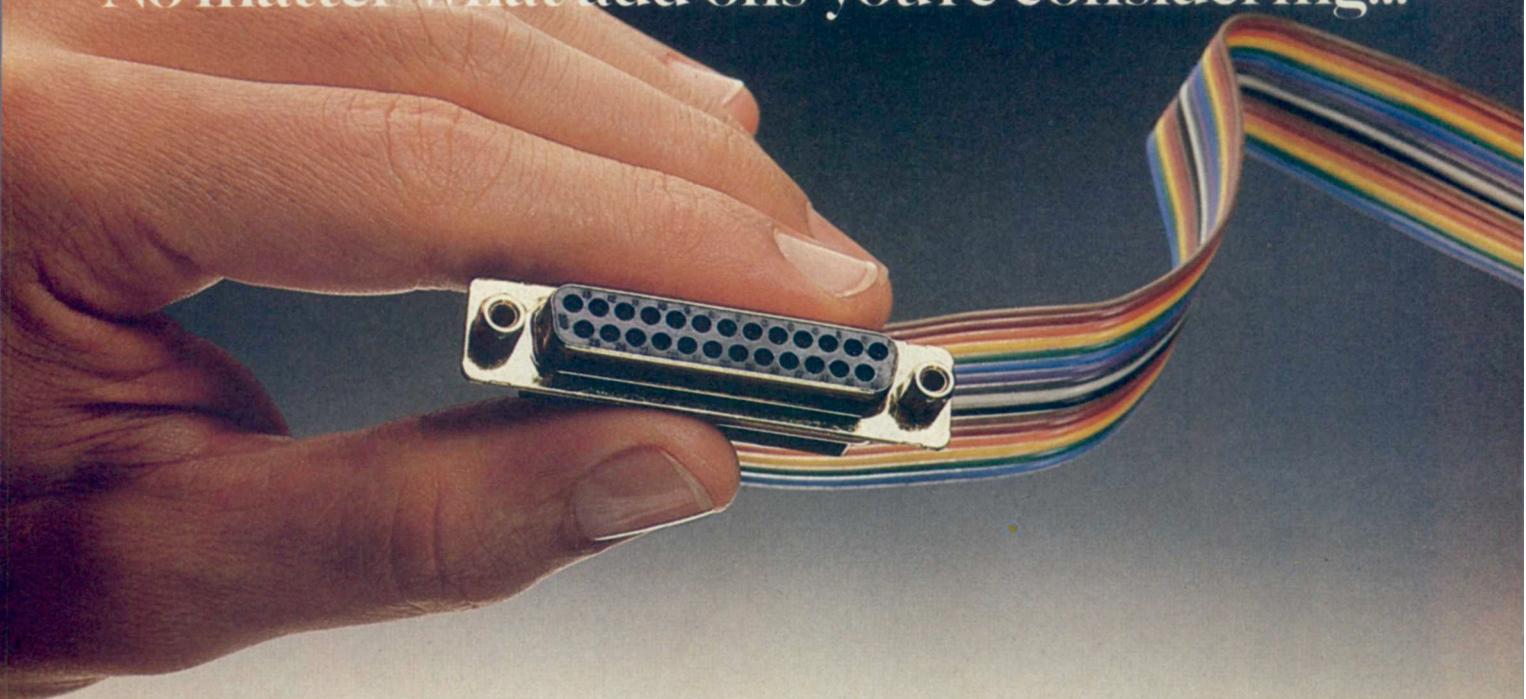
Creative Computing Press

Morris Plains, NJ 07950
Toll-free 800-631-8112
(In NJ 201-540-0445)

Table 1. Changes from Version 1.0.

Statement or Function with Change	Discussion	Statement or Function with Change	Discussion
AUTO Deleted	Used to add line numbers automatically.	ON BREAK GOSUB Added	Transfers control to a subroutine when user presses Command-period (Break).
BREAK ON/OFF/STOP Added	Enables, disables, or suspends trapping of user attempt to stop program execution.	ON DIALOG GOSUB Added	Transfers control to a subroutine when user performs any action affecting a dialog box.
BUTTON Added	Controls display of option buttons in user-created windows.	ON MENU GOSUB Added	Transfers control to a subroutine when user selects a menu item.
CALL Expanded	Dual purpose. Used to call machine language programs as in 1.0. Also calls new Subprograms.	ON MOUSE GOSUB Added	Transfers control to a subroutine when user presses the mouse button.
CSRLIN Added	Returns approximate line number of cursor within current output window.	ON TIMER GOSUB Added	Transfers control to a subroutine based on a given time interval.
CVDBCD Added	Returns binary math representation of decimal math floating-point number.	PICTURE Added	Draws a picture stored with PICTURE ON statement.
DIALOG Added	Monitors when and how user is interacting with buttons, edit fields, and windows.	PICTURE ON/OFF Added	Turns on or off the recording of all screen activity.
DIALOG ON/OFF/STOP Added	Enables and disables event trapping based on dialog events.	PICTURE\$ Added	Returns a string containing the entire picture recorded by previous PICTURE ON statement.
EDIT Deleted	Displays specified program line number for editing.	RENUM Deleted	Renumbered program lines.
EDIT FIELD Added	Creates rectangular area for data entry and allows user entry.	SAVE Expanded	"B" option forces binary file save.
EDIT\$ Added	Returns contents of an edit field.	SCROLL Added	Scrolls a defined area vertically or horizontally.
FILE\$ Added	Displays standard Mac dialog boxes to allow user to select a file.	SHARED Added	Defines specified variables within a subprogram common to variables of the same name in the main program.
LBOUND/UBOUND Added	Returns lower and upper bounds of the dimensions of an array. Useful to determine the size of an array passed to a subprogram.	SOUND Added	Produces a sound; builds and plays a queue of sounds.
LOCATE Added	Positions the writing pen at a specified column and line.	SUB/END/SUB/EXIT SUB Added	Starts, ends, and exits a subprogram.
MENU Added	Creates custom bar menus and the option choices beneath them.	TIMER ON/OFF/STOP Added	Enables, disables, and suspends event trapping based on time.
MENU ON/OFF/STOP Added	Enables, disables, or suspends event trapping based on menu selections.	UCASE\$ Added	Returns a string with alpha characters in upper case.
MKSBCD\$/MBDCD\$ Added	Returns a random file buffer string which is a decimal math representation of a binary math floating-point number.	WAVE Added	Defines the shape of a sound wave for a voice and enables or disables multivoice sounds.
MOUSE ON/OFF/STOP Added	Enables, disables, or suspends event trapping based on pressing of the mouse button.	WIDTH Expanded	Minor syntax expansions.
		WINDOW Added	Creates and closes output windows of various types; can redirect output from the screen to a file.

No matter what add-ons you're considering...



WE TEST HARDWARE THE WAY YOU USE IT.

Searching out new hardware can be time consuming and expensive. Will an IBM product be compatible with your Apple? Is a dot matrix printer a better choice than an ink-jet? And, how much should you pay?

To get the answers, you need CREATIVE COMPUTING, the magazine with complete, unbiased information covering all hardware and peripherals.

Our editors torture-test all hardware and peripherals—under the conditions you use it—and then report back to you in a clear, understandable style.

CREATIVE COMPUTING works all new products... interfacing modems with different systems... checking monitors for distortion and eye strain and comparing how quickly disk-drives process data.

And CREATIVE COMPUTING reviews operating instructions for clarity and documentation with you in mind.

No matter what add-ons you're considering, you know you can make the right purchasing decision, because CREATIVE COMPUTING has tested the product the way you'll use it.

Stay in the know and make the most out of your computer!

—Get CREATIVE COMPUTING and save up to 50%!

- 9 issues for only \$997.
SAVE 47%!

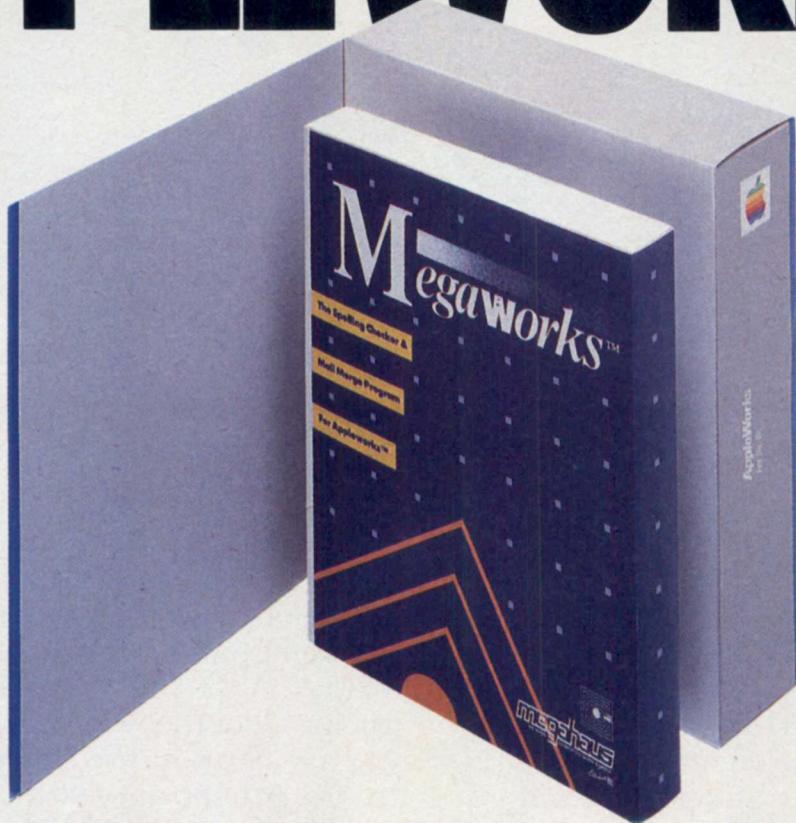
- 12 issues for only \$1297.
SAVE 48%!

- 24 issues for only \$2497.
SAVE 50%!

For fast service call toll free,
1-800-852-5200



MEGAWORKS™ WITH APPLEWORKS™.



You already know AppleWorks™ is the powerful program that combines the three most popular applications for your Apple //e and //c. Its only drawback is the absence of two key functions.

That's why Megaworks with AppleWorks.

Megaworks is the mail merge and spelling correction program designed exclusively to complete the AppleWorks package. Your knowledge of AppleWorks makes

MegaWorks simple to use. Mail merge lets you print personalized form letters from a single master letter and list. The spelling checker corrects misspelled words in documents and "word wrap" retains its original format, a function unavailable in many popular programs. The dictionary allows you to personalize your work with the addition of 10,000 words to its 40,000 word library.

Megaworks completes AppleWorks.
See the complete works for your Apple //e and //c today at a dealer near you. Or send for our free, no obligation brochure.

megahaus™
WE MAKE COMPUTERS WORK HARDER.

5703 Oberlin Dr.
San Diego, CA 92121
619-450-1230

Easier!

CIRCLE 132 ON READER SERVICE CARD

program flow (a good practice with free-form languages like Pascal, C, and now, Mac Basic), and aids this method by having the editor retain any active indentation when RETURN is hit at the end of a line. Users of UCSD and Turbo Pascal will recognize what a convenience this can be.

Language Syntax

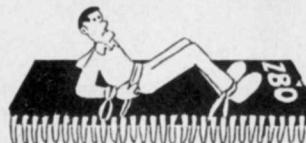
Mac Basic 2.0 is a direct descendant of the Microsoft Basics that have come before. The good points, like flexible string manipulation, as well as the bad aspects, like the convoluted random access disk file methodology, have been retained. Table 1 (page 48) details the changes from the earlier version.

There are obviously too many changes to discuss in detail, but a few broad trends can be discerned easily. Version 2 adds almost complete control of Macintosh interface features like pull-down menus, windows with size bars, use of the mouse, various buttons and dialog boxes, and field editing. About the only things missing are scroll bars on program-created windows. The various commands to control interface-type events are reasonably straightforward, and several excellent examples are provided in the manual and on disk in the form of sample programs.

Programming purists may think the most important aspect of the new language is the subprogram mechanism. Subprograms are *not* like subroutines; they are, rather, much more like procedures or functions in languages like Pascal and C. Parameters passed to the subprogram can be either reference or value, and variables can be local or global. The subprogram scheme is far superior to multi-line functions and adds a new dimension to the ability to produce and maintain structured code in Basic.

Other significant additions include manipulation of graphic images within Basic, improved control of the Mac sound generating hardware, and a function to convert strings to uppercase. There have, however, been some deletions as well. The language allows programs with line numbers, but the numbers aren't used as they are in other Basics. Line numbers are merely labels; adding a line with a line number does *not* insert the new line. Since line numbers are discouraged, the AUTO and RENUM commands have been eliminated. EDIT has been removed too, because the new method of windowing eliminates the need for an explicit command to edit a line.

TIED TO AN 8-BIT CP/M COMPUTER AND SMALL SPREADSHEETS?



ADD CO-POWER TO GET MS-DOS AND UP TO 1024K OF MEMORY!

CO-POWER is an 8088 coprocessor for Z80, CP/M computers. CO-POWER-88 has up to 256K RAM and CO-POWER-Plus up to 1024K! Both install inside your computer's case and include MS-DOS 2.11 and RAMDISK.

Most MS-DOS and some PC-DOS programs run on your CO-POWER system. Make large databases and spreadsheets without losing your CP/M system. Kaypro 2X, 4/84 and 10s can even run LOTOS 1-2-3!

PLUS CO-POWER's RAMDISK feature turns its RAM into a high-speed CP/M drive.

For Kaypro, Osborne, Morrow, ATR, Xerox & Zorba computers. \$400 — \$986

ATR8500 . . . THE COMPUTER SYSTEM THAT LETS YOU CHOOSE YOUR COMPONENTS

SPECS

- Z80A CP/M computer that's also the complete ATARI interface
- 64k RAM
- Runs up to 4 5 1/4" drives 40T, 80T, SS & DS
- Serial and parallel ports for a printer and modem
- Uses a terminal or an ATARI plus tv/monitor for display

- Includes user-friendly CP/M 2.2
- Comes with a program to read 40+ CP/M formats
- Has a Z80 expansion bus
- Optional DMA controller
- Available as a kit (from \$250) or fully A&T with optional built-in drives
- Hard disk coming soon



For more information and orders, contact us at:
1000 W. Fuller
Fort Worth, TX 76115
817-924-7759

RAMDISK	
MS-DOS	CP/M 86
○	○
CO-POWER	
CP/M	MYDOS
○	○
PRINTER	
MODEM	
DRIVES	
ATR8500	
ATARI and/or TERMINAL	

NEW ADDRESS!

CIRCLE 165 ON READER SERVICE CARD

RETAILERS TAKE NOTE

Create an educated and aware customer with **CREATIVE COMPUTING!**

Every issue brings your customer new ways of using their microcomputer PLUS it's a "silent salesperson," helping users select new peripherals, software and hardware. If you're interested in a low ticket item that's efficient, effective and profitable, call us today! CALL 212-503-5380!



Or write: Ziff-Davis Publishing Company
Retail Sales Department
One Park Avenue—4th Floor
New York, NY 10016

CALL OR WRITE TODAY!



FOR THE APPLE...
Business

PFS:

WRITE/FILE/REPORT

\$78.00

FOR THE IBM...

Business

LOTUS

1, 2, 3

\$300.00

Sensible Speller \$ 79.00
Dollars & Sense 69.00

Symphony \$440.00 Utilities
dBase III 360.00 PRINT
Multimate 280.00 SHOP

Word Perfect 255.00
Microsoft Word 235.00

Harvard Total Project Man. 310.00

PFS: File 87.00 Fontrix 1.5 \$ 60.00

PFS: Plan 87.00 Fontpacks 1-11 ea. 15.50

PFS: Report 78.00 Copy II + 5.0 22.00

PFS: Write 87.00 Ess Data Dup. 45.00

Dollars & Sense 114.00 G.P.L.E. 32.00

Systems/Utilities Triple Dump 25.00

SIDE Graphics Lib. 1 18.00

KICK Sideways 38.00

Apple Mechanic 19.00

Hardware

MACH III

JOYSTICKS

\$34.00

System Saver \$ 63.00

Microsoft A-2 Drive 195.00

Drive Koala Pad 80.00

Muppet Keypad 50.00

Extended 80 Col. Card 99.00

Education/Recreation

HITCH HIKERS

GUIDE

\$35.00

Typing Tutor III \$ 34.00

Masterype 26.00

Early Games 20.00

Barrons S.A.T. 57.00

Word Attack 34.00

Robot Odyssey 1 34.00

Sticky Bear ABC 26.00

Seven Cities of Gold 29.00

Flight Simulator II 34.00

One on One 29.00

Quest 24.00

Math Blaster 34.00

Kindercamp 21.00

Bank St. Writer 44.00

Gemstone Warrior 26.00

Hitchhikers Guide 25.00 Millionaire 34.00

Typing Tutor III 34.00 Sargon III 34.00

Barrons S.A.T. 57.00 Wizardry 32.00

Word Attack 34.00 Ultima III 39.00

Personal checks allow 2 wks. Visa & MasterCard add 3% for handling. Send card # & exp. date. U.S. A.P.O. & P.O. include \$3.00 for shipping. C.O.D. add \$5.00 + \$3.00 for shipping. Printers & monitors add \$10.00 + \$3.00 for shipping. Ohio res. 5% sales tax. We accept purchase orders from qualified organizations. Prices subject to change without notice.



FAS-RACK
COMPUTER PRODUCTS



4410 Westerville Rd.
Columbus, OH 43229

(614) 436-1124

OR TOLL-FREE OUTSIDE OHIO

1-800-272-1600

CIRCLE 112 ON READER SERVICE CARD

LANGUAGE

PRODUCT REVIEW

Performance

Using Version 2 is simple and straightforward. Microsoft has improved the program entry and editing process tremendously in terms of both ease of use and appearance. Making the Basic editor act like *MacWrite* makes the entire product much more intuitive and friendly.

Working without line numbers will seem strange to those whose only language is Basic, but it removes a major annoyance for Pascal and C programmers. Microsoft did not go quite all the way with the anti-line number movement, however. The error trapping and handling routines are still line number oriented. For example, **ON ERROR ERL** reports only line *numbers*, not labels. Another example of the halfway implementation is that no error trapping is possible in subprograms.

Putting this minor problem aside, the subprogram mechanism is a tremendous advance. Devoted fans of structured programming techniques now have a Basic with much improved control facilities. Perhaps Microsoft could have gone even further (**REPEAT UNTIL** clauses, for example), but Version 2 is a

few real clunker mistakes like reversing the order of a statement phrase. Where a statement serves dual purposes, an example is provided for only one usage. Many more examples could be provided for **WINDOW**, **MOUSE**, **MENU**, **DIALOG**, **BUTTON**, and the other new statements (see tutorial elsewhere in this issue), and there is practically no discussion of the characteristics of the Mac ROM routines and how to use them effectively.

Given how different Version 2 looks, compatibility with Version 1 is surprisingly good. Assuming that a Version 1 program is saved in straight ASCII text mode (not in compressed binary form), the chances are that it will run with few or no changes under Version 2. Of course, the reverse isn't true; use of any of the advanced features of Version 2 will restrict use to owners of the new release.

This brings up some partially realistic and partially philosophic questions. Microsoft Mac Basic provides excellent access to Macintosh capabilities which were not previously available to the average Mac owner, but what is the purpose? Is this mythical "average Mac

Table 2. Benchmark and Sieve test.

Creative Computing Benchmark				
Version	Time	Accuracy	Random	Sieve Time
MBasic 1	1:35	.0000000458	7.1885600089	18:55
MBasic 2 BCD	1:08	.0000000556	7.1885600089	19:04
MBasic 2 Binary	0:19	.01269531	7.188416	19:01

giant step in the right direction.

Performance was tested with the *Creative Computing* benchmark and the standard 10 iterations of the *Byte* Sieve of Eratosthenes test. Results are shown in Table 2.

None of these benchmarks is particularly fast. The tradeoff between the speed and accuracy of binary and BCD math is readily apparent in the simple *Creative* benchmark. The Sieve test uses integer math, which is obviously essentially the same in the various versions. Overall, the interpreter doesn't match a compiler, which is no surprise, but the Microsoft products perform reasonably well.

Documentation is generally rather good, as in most of Microsoft's Macintosh products. Since their manuals for products for other computers are generally mediocre to horrible, the Mac manuals are a real advance. However, there are some problems. A couple of the example programs don't run, and there

owner" a programmer? If so, the new Basic is great, but what is the likelihood of commercial programs that would require the purchaser to have MS Basic 2.0 being distributed? There have been examples of decent software distributed in Basic source form (or in the low security "protected" mode), but what is really needed is a true *compiler* if MS Mac Basic is to become a true development language. With the new subprograms and other advanced features, the language could actually be a viable choice for commercial program development—especially if the compiler offered the speed increases seen in Microsoft's other interpreter/compiler families. We can only hold our breath for the compiler version. In the meantime, Version 2 is a valuable addition to the Macintosh software arsenal.

Microsoft, 10700 Northrup Way, Bellevue, WA 98004, (206) 828-8080.

CIRCLE 406 ON READER SERVICE CARD



SINCE 1977

Computer Discount Products

Monthly Mail-Order Listing
For Apple, IBM & Macintosh Users

Retail Showrooms In California:
San Jose • San Mateo • San Francisco

**WE PAY
SHIPPING***
Get The Details Below!!

PRINTERS & MONITORS **SCALL**

OKIDATA 92 w/Plug 'n Play	459.99
PRINCETON HX-12	459.99
Max-12 Amber	179.99
TAXAN 12" Amb-IBM	169.99
420 RGB Color	399.99

MOCKINGBOARD IIC	
With Speech & Sound	169.99
QUADVUE NEW!	
Monochrome Card	259.99

HARDWARE

CDP 16K Ram Card	39.99
Parallel Interface w/Cable	39.99
DAN PAYMAR Lower Case 1	25.99
Lower Case 2, Rev 7	19.99
EXTENDED 80 Col. Card-Ile	129.99
KENSINGTON System Saver	65.00
MICRO-SCI A-2 Drive	199.99
ORANGE MICRO Grappler +	114.99
Buffered Grappler	179.99
THUNDERCLOCK	109.99
TITAN Accelerator Ile	259.99
Neptune 64	199.99
AST Six Pack Plus 64K	279.99
KENSINGTON PC Saver	29.99
QUADRAM 512 + 64K	229.99
Microfazer 8K/All Config.	149.99
Quadboard I or II-No K	219.99
TEAC ½ Height Drive #55B	159.99

APPLICATION - Home & Business

Ap ASCII Express	99.99	IBM MICROPRO Telmerge	119.99
Ap CONTINENTAL Hrm Acct.	44.99	IBM MONOGRAM Dollars & Sense	109.99
Ap Home Accountant MAC	75.99	IBM PFS Rept, File, Graph, Write	ea99.99
Ap Tax Advantage	39.99	Ap/IBM MICRO COOKBOOK	31.99
Ap MONOGRAM Dollars & Sense	79.99	Ap/IBM MICROSOFT MULTIPLAN	169.99
Ap PFS Rept, File, Graph, Write	ea84.99	MAC MULTIPLAN/FILE	ea149.99
IBM ASCII Express Pro	139.99	MAC PFS Rept, File	ea89.99
IBM ASHTON-TATE dBase II	299.99		
IBM dBase III	449.99		
IBM Framework	399.99	HAYES 300 Baud	209.99
IBM CONTINENTAL FCM	71.99	1200B for IBM	409.99
IBM Home Accountant	84.99	Micromodem Ile	239.99
IBM Tax Advantage	49.99	NOVATION Appletac II 300 Bd.	249.99
IBM CROSSTALK	139.99	Expansion Module	29.99
IBM LOTUS 1-2-3	299.99	J Cat	109.99

MODEMS

HAYES 300 Baud	209.99
1200B for IBM	409.99
Micromodem Ile	239.99
NOVATION Appletac II 300 Bd.	249.99
Expansion Module	29.99
J Cat	109.99

EDUCATIONAL

DLML

Ap Alien Addition/Minus Mission	ea22.99
Ap Alligator Mix	22.99
Ap Division/Multiplication	ea22.99
Ap Dragon Mix	22.99
Ap Spelling Wiz/Verb Viper	ea31.99
Ap Word Invasion/Word Radar	ea31.99

LEARNING COMPANY

Ap Bumble Games/Pilot	ea27.99
Ap Gertrudes Puzzle/Secret	ea29.99
Ap Rockys Boot/Robot Odyssey	ea34.99
Ap/IBM Addition Magician	23.99
Ap/IBM Magic Spell/Number Stump.	ea27.99
Ap/IBM Moptown Hotel/Parade	ea27.99
Ap/IBM Reader Rabbit	27.99
Ap/IBM Word Spinner	24.99

PEACHTREE

Ap Algebra I-IV	ea29.99
Ap Algebra V & VI	ea34.99

SPINNAKER

Ap Grandmas House	24.99
Ap Kids On Keys	19.99
Ap Kidwriter	24.99
Ap Rhymes & Riddles	19.99
Ap Sum Ducks	24.99
Ap Trains	27.99
Ap/IBM Alphabet Zoo	19.99
Ap/IBM Delta Drawing	34.99
Ap/IBM Facemaker/Fraction Fever	ea24.99
Ap/IBM Diddle Diddle/Kindercomp	ea19.99
Ap/IBM Presidents Choice	27.99
Ap/IBM Snooper Troops I or II	ea31.99
Ap/IBM Story Machine	24.99

COLLEGE BOUND - Apple

BARONS SAT	59.99
CBS Mastering SAT	149.99
PEACHTREE SAT	37.99
PEACHTREE PSAT	37.99

Muppet Keys 59.99

UTILITIES & ENHANCEMENTS

Ap BEAGLE D/Code - NEW!	SCALL	IBM	NORTON UTILITIES	55.99
Ap Beagle Graphics	44.99	IBM	SIDEKICK	41.99
Ap Dos Boss	17.99	Ap/IBM	COPY II Program	25.99
Ap Fat Cat	26.99	Ap/IBM	TURBO PASCAL	41.99
Ap GPLE	32.99	MAC	COPY II Program	25.99
Ap Triple Dump	31.99			
Ap EASTSIDE Wildcard II	111.99			
Ap FONTRIX	59.99			
Ap FINGERPRINT For Epson	44.99			
Ap KOALA Touch Pad	85.99			
Ap MERLIN	44.99			
Ap MOCKINGBOARD	89.99			
IBM FONTRIX	99.99			
IBM KOALA Touch Pad	95.99			

VIDEX-Apple

ENHANCER II	99.99
FUNCTION STRIP	31.99
HARDSWITCH	14.99
PSIO	169.99
SOFTSWITCH	25.99
ULTRATERM	244.99
VIDETERM	219.99

ENTERTAINMENT

BEAGLE I.O. Silver - NEW!

Ap BEAGLE I.O. Silver - NEW!	SCALL
Ap DECATHLON	23.99
Ap MASTERTYPE	31.99
Ap SIR TECH Knight of Diamond	27.99
Ap Legacy of Lylgamyn	31.99
Ap Wizardy	37.99
Ap Wizprint	19.99
Ap WIZPLUS	23.99
IBM GATO	29.99
IBM MASTERTYPE	34.99
IBM SIR TECH Wizardry	44.99
Ap/IBM CHAMP.LODERUNNER	24.99
Ap/IBM ELECTRONIC ARTS Archon	31.99
Ap/IBM Music Set/Pinball Set	ea31.99
Ap/IBM One On One/Sky Fox	ea31.99
Ap/IBM Seven Cities of Gold	31.99
Ap/IBM FLIGHT SIMULATOR	37.99
Ap/IBM NIGHT MISSION PINBALL	32.99
Ap/IBM SARGON III	34.99
Ap/IBM SIERRA ON LINE Frogger	24.99
Ap/IBM ULTIMA II or III	39.99
Ap/IBM Fahrenheit 451/Shadow	ea29.99
Ap/IBM WINDHAM Below The Root	18.99
Ap/IBM Swiss Family Robinson	18.99
MAC MAC FUN	29.99
MAC MAC VAGAS	43.99

TRILLIUM

ea29.99

Now Telarium
Amazon, Rama, Shadowkeep

Fahrenheit & Dragonworld

INFOCOM

APPLE-IBM-MACINTOSH

CUTTHROATS/ENCHANTER	ea27.99
DEADLINE/SUSPECT	ea34.99
INFIDEL/SORCERER	ea31.99
PLANETFALL/SEASTALKER	ea27.99
WITNESS/ZORK I	ea27.99
ZORK II/ZORK III	ea31.99

HITCHHIKERS GUIDE

27.99

WORD PROCESSING

Ap BANK STREET Write/Spell	ea44.99
Ap MICRORAD Wordstar	279.99
Ap Wordstar Pro w/CP-M	349.99
Ap SENSSIBLE SPELLER	89.99
Ap SIERRA Screenwriter II	89.99
IBM BANK STREET Writer	59.99
IBM LIFETREE Volkswriter Deluxe	199.99
IBM MICROSOFT Word w/Mouse	299.99
IBM MICROSOFT Wordstar 2000	259.99
IBM Wordstar 2000 Plus	359.99

Computer Discount Products

860 So. Winchester Bl., San Jose, CA 95128

(408) 985-0400 FROM 8AM PST

NO CHARGE FOR CREDIT CARDS • GUARANTEED FAIR PRICING

Purchase Order Prices Differ - Call First • Prices Subject To Change • Software Sales Final

PLEASE ALLOW TIME FOR PERSONAL CHECKS TO CLEAR

**ORDER
#C5**

**ALL SOFTWARE SHIPPED
FREIGHT-FREE**

U.S. Mail - \$10 Minimum Chg.
Hardware Shipping - \$CALL

CIRCLE 106 ON READER SERVICE CARD

Point and Click In Microsoft Basic

A Macintosh tutorial

John J. Anderson

This article is aimed at Macintosh owners specifically. But even if you are not a Mac owner, you may find the following tutorial interesting and potentially helpful. The GEM operating system, now available from Digital Research for the MS-DOS operating system, will also be built into ROM on the new 68000-based ST series machines from Atari. GEM creates a desktop environment very similar to that of the Macintosh; it is likely that any strong GEM-tailored Basic will work similarly to Macintosh Basic 2.0—JJA

Ever since you took your Macintosh out of the box, you've loved those pull-down menus, windows, and push-button operations. They make using a computer about as easy and enjoyable as it is likely to become in the foreseeable future. But even as you have grown accustomed to the point-and-click way of life, one peevish disappointment may have nagged at you. Sure, all that magic is addictive. But how to get those wonderful things working in your own programs?

After the initial issue of a rather disappointing Macintosh version of Basic over a year ago, Microsoft Corporation truly has made amends with Mac Microsoft Basic 2.0. This version of the language is at long last deserving of its target machine and is nearly bug-free. It is totally structured, and though line numbers remain an option, there is no need for them. Procedures and sub-procedures can be nested to your heart's desire. And, because this version of Basic offers countless hooks to the Mac Toolbox, pull-down menus, custom windows, dialog boxes, and point-and-click operations can make your Basic programs indistinguishable from professional software products in terms of the user interface.

In this tutorial we'll take a look at how you can harness these features, albeit in a very simple manner. Once you understand the basics unveiled here, you can incorporate these powerful capabilities to make your programs look and act the way they should on a machine of the caliber of the Apple Macintosh: namely, polished.

I should also mention at the outset that for those of you not inclined to type in listings, all the programs that follow are available for download in the Apple Cart section of Creative Computing Online (Compuserve PCS-22).

One more thing before we get to the meat and potatoes. Here are a few guidelines for Basic programming: always skip a line before beginning print in your listings. This will avoid scrunched lines in hard copy due to a bug in the Mac printer

driver. Don't ignore the strong editing features of your Macintosh. Cut and paste can save you lots of time when entering repetitive lines of code. Finally, notice that colons are optional between separate commands on a single line. I tend toward including them out of long-term habit, but you can leave them out if you so desire.

Creating a Custom Menu

As I mentioned long ago in my initial review of the Mac, point-and-click is not just a gimmick; it is a powerful approach to computer use. However, without its slick user interface, the Macintosh is just another computer. Unfortunately, some programming languages for the Mac manage to reduce it to that lackluster category, by making it quite difficult for all but the most expert programmer to get the Macintosh Toolbox working. Microsoft Basic 2.0 has changed that. Listing 1 throws a customized menu up onto the ruler in a mere 22 lines.

Listing 1.

Beginner's example of MENU control.

```

MENU 1,0,0,"" : turn off menu column 1
MENU 2,0,0,"" : turn off menu column 2

MENU 3,0,1,"Americas": this will be column 3 header
MENU 3,1,1,"Argentina"
MENU 3,2,1,"Brazil"
MENU 3,3,1,"Canada"
MENU 3,4,1,"U.S.A"

MENU 4,0,1,"Europe": this will be column 4 header
MENU 4,1,1,"Britain"
MENU 4,2,1,"France"
MENU 4,3,1,"Germany"
MENU 4,4,1,"Switzerland"

MENU 5,0,1,"Asia": this will be column 5 header
MENU 5,1,1,"China"
MENU 5,2,1,"India"
MENU 5,3,1,"Japan"
MENU 5,4,1,"South Korea"

Idle: 'up ahead we'll see why this has been named as such
PRINT"Explore menus with mouse..."PRINT PRINT
PRINT"Press <RETURN> to exit to Basic"
INPUT e$: " gives you a chance to explore menus
MENU RESET STOP: " gives you a chance to break out of menus.

```

Educational Software
That Works:

Spell.

Spell It!

Spell expertly 1000 of the most misspelled words. Learn the spelling rules. Improve with 4 exciting activities, including a captivating arcade game! Add your own spelling words.

ages 10 — adult / 2 disks \$49.95

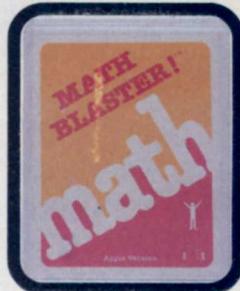


Math.

Math Blaster!

Master addition, subtraction, multiplication, division, fractions, decimals and percentages — by solving over 600 problems. Learn your math facts with 4 motivating activities, including a fast-action arcade game! Add your own problems.

ages 6 — 12 / 2 disks \$49.95

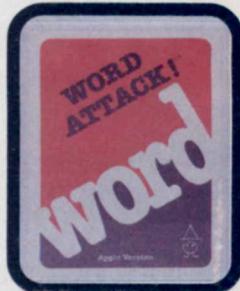


Word.

Word Attack!

Add 675 new words to your vocabulary — with precise definitions and sentences demonstrating usage. Build your skills with 4 fun-filled activities, including an arcade game! Add your own words.

ages 8 — adult / 2 disks \$49.95



Read.

Speed Reader II

Increase your reading speed and improve comprehension! Six exercises designed by reading specialists vastly improve your reading skills. Chart your own progress with 35 reading selections and comprehension quizzes. Add your own reading materials

high school, college & adult / 2 disks \$69.95



The Davidson Best Seller Tradition.

For your Apple, IBM or Commodore 64
Ask your dealer today.

For more information call: (800) 556-6141
In California call: (213) 373-9473

Davidson & Associates
6069 Groveoak Place #12
Rancho Palos Verdes, CA 90274

CIRCLE 110 ON READER SERVICE CARD



Davidson.



Introducing PC software the right way to do

IBM's new Personal Decision Series.
A powerful team of business
programs designed for exceptional
flexibility.

There's rarely one best way of doing
anything.

Rather, lots of very good ways; a
reality that IBM's Personal Decision
Series handily accommodates.

More than any software we know of,
it gives you choices. You tailor it to your

needs, instead of vice versa.

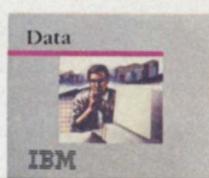
You begin with *Data Edition*, a pro-
gram that not only manages huge
amounts of information, but lets you take
it from a surprising variety of sources:
data banks, mainframes, even files cre-
ated by other PC programs.

And you can retrieve your data in
nearly any form you like, without a lot of
headscratching. You can begin produc-
ing real work in a couple of hours.

Add *Reports+* and you can create

your own style documents, pulling facts
from up to 6 *Data* files at a time, in
formats you can design, for applications
you can invent.

Graphs gives you a choice of 13
graph styles, with over 20 variations.
And you can update old graphs without



With IBM's new Personal Decision Series,
you start with *Data Edition*, adding others, like
Reports+ or *Plans*, as you like.

For even more help, you can add *Appoint-*



based on the curious notion that things is any way you want to.

having to make new ones.

There's also *Plans+* for financial modeling and spreadsheets, and *Words* for putting your sentences, numbers and graphs all together.

The Personal Decision Series can even take information from a number of

non-Series programs. So if you already have a favorite spreadsheet or writing program, you may still be able to use it.

You can even use files from an IBM System/36 or System/370 computer, by adding an *Attachment/36* or */370 Edition*.

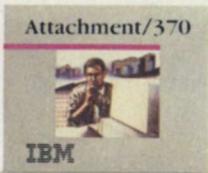
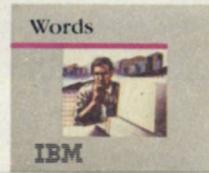
All of which is perfect for people

who insist on doing things their way.

Do you know somebody like that?

To learn more, call an IBM marketing representative, or visit an IBM Product Center or authorized IBM PC dealer.

For the store nearest you, and a free brochure, call 800-447-4700. (In Alaska and Hawaii, 800-447-0890.)



ment Calendar; Client Time/Cost Accounting, and Prospect Tracking Editions.

Also, the Personal Decision Series works with data from IBM's new *Business Management*

Series, a powerful family of accounting programs.

And ask about IBM Extended Support services, a way to get software updates and telephone assistance direct from IBM.

IBM®

Personal Computer Software

CIRCLE 113 ON READER SERVICE CARD

MAKE NO MISTAKE...

CALKIT for your Commodore 64 is a powerful, real-world problem solver. Faster, easier and more accurate than pencil, paper and calculator – and a lot less frustrating.



CalKit helps you solve household and small business problems that involve rows and columns of numbers.

- balance your chequebook in seconds
- plan your home or business budget with ease
- simplify your income tax, and your investment portfolio
- calculate loan or mortgage payments, and then find out what happens to them in seconds, when interest rates change

That's the real advantage – with CalKit, you can change any number in your equation, and see how it affects the other numbers. All calculations are performed instantly! CalKit gives you the answers, in the

time it takes to ask "What If...?" You can make projections and plan ahead with confidence!

The CalKit problem-solving package includes built-in templates for the most important home and business needs. Over 20 ready-to-use, real-life applications on one disk. The rows, columns and calculations are already defined. No need for time-consuming initial set-ups – all you do is enter your data. Other CalKit features, like on-screen menu and simple commands, make it even easier.

An easy and comprehensive manual with tutorials on each application are included. You'll be using CalKit like a pro, right out of the box. And once you've mastered the built-in templates, you'll be ready for your own unique spreadsheet programs.

Powerful solutions + ease of use + low low cost = CalKit. It all adds up to exceptional value, for a computer program that can help you every day.

BATTERIES



INCLUDED

"The Energized Software Company!"

WRITE FOR A FULL COLOR BROCHURE

186 Queen St. West
Toronto, Ontario,
M5V 1Z1 Canada
(416) 596-1405

17875 Sky Park North,
Suite P, Irvine, California
USA 92714

As you can see, the command MENU is used to get things going. The MENU argument is structured as follows:

MENU <menu id, item id,[state, name> ...where

menu id = the menu header number (range 1-10); you cannot reassign the desk accessory header

item id = the menu item number (range 0-20); you cannot have more than 20 items on an individual header

state = condition flag (range 0-2); 0 (disable); 1 (enable); 2 (enable with checkmark)

name = title of the header or item

At the top of Listing 1, we first shut off menu columns 1 and 2 entirely. Note that even when there is no title, the quote marks must still appear. We then assign to menu bar slots 3, 4, and 5 the names of continents and countries. Notice that the lead item for each slot is the header, which is then directly followed by its item list set. The item id progresses from 0 to 4 in each case.

From there we move to a procedure called "Idle." Certainly we could have left this bit of code unlabeled, and it would still run—but up ahead we shall see why it merits a name. Within this procedure there are some very recognizable Basic commands. We do some printing, then freeze the action by prompting for keyboard input. When the program is run, you can nose around these menus for as long as you like, until you are convinced that they have been created with lots of help from the Toolbox. Notice that each menu box is perfectly sized to conform with the header and item names. When you click off them, they flash. They await your further instructions. By gaining access to the Toolbox, you can make the 64K of ROM inside the Macintosh work for you.

When you press RETURN, the program calls back the Microsoft Basic menus with the command MENU RESET, and then STOPS. It is imperative that you avoid painting yourself into corners when redefining menus. Once you modify the menu bar, you must provide a way out. Failure to do so results in loops that can be broken only with a flip of the power switch.

Menu-Based Escape Hatch

Listing 2 makes escape from a customized menu an actual selection of that menu. For our purposes that is appropriate, and we will carry that method through in all the programs here, so you can easily move from the actual program to a listing of that program, to see how things work (or don't work). Listing 2 also gives us a first taste of branching from a pull-down menu. The command ON MENU GOSUB launches our simple search. The command MENU ON traps for the ON MENU GOSUB command.

Think of the procedure Idle as a car sitting in neutral, idling. In this case all we want the procedure to do is keep the motor running—hence the procedure loops in an endless GOTO itself. Most programs ultimately hinge off a loop of some kind; if you call such a loop Idle in all your programs it will make them easier to understand.

To follow through with the metaphor, the "transmission" of this program is the procedure Menucheck. We define the variable Itemchoice as the value of MENU(1). Because there is only one header in this chunk of code, we need not count headers at all; we need to count only items of that single header. If MENU(1) returns a value of 1, the selection "Exit to Basic" has been chosen, so we'll GOSUB procedure Breaker. If it returns a value of 2, we'll GOSUB procedure Exitter.

Listing 2.

Creating an escape hatch.

```
MENU 1,0,1,"Stop";'move loop breaker up onto menu
MENU 1,1,1,"Exit to Basic"
MENU 1,2,1,"Exit to desktop"
MENU 2,0,0,"' turn off the rest of the menus
MENU 3,0,0,"'
MENU 4,0,0,"'
MENU 5,0,0,"'
```

ON MENU GOSUB Menucheck MENU ON ' search for branching

Idle:

GOTO Idle: ' all we need here is an endless loop

Menucheck:

```
Itemchoice=MENU(1)'items underneath headers
ON Itemchoice GOSUB Breaker,Exitter
MENU Menucheck,0,1' unhighlights menu bar
RETURN
```

Breaker:

```
MENU RESET
STOP
RETURN ' is just here for aesthetics
```

Exitter:

```
SYSTEM
RETURN ' this too, but always RETURN from GOSUBS
```

The line MENU Menucheck, 0,1 removes highlighting from the header when it is deselected. Otherwise the highlighting gets stuck in the "on" position. The variable Menucheck can remain undefined in this listing as it will always be 0; there are no other choices to be had. Further ahead that will no longer be the case.

The procedures Breaker and Exitter are quite straightforward. The former reverts to MS-Basic just as it did in Listing 1. The latter is included for purposes of example, to show how the command SYSTEM closes all open files and returns control to the Finder program. In functional programs, this is a more appropriate escape than that provided by a simple STOP.

Both RETURN statements in these subroutines could be deleted, as the program will never reach them. Still, it is a good idea to get in the habit of returning from all your GOSUBS—a habit that may save you debugging time when writing much more complex code.

Checking Things Out

So far we have branched from menu selections directly to unique subroutines. However, many times a menu selection serves not as a specific branch but rather to modify other menu selections, which is one thing we're out to do here. An indispensable Toolbox tool for this purpose is the check mark. Listing 3 gives us a succinct example of how to get one going.

First we get Breaker installed into menu slot 1. Then we create a menu as we did in the previous example, with one alteration: we put a check mark next to the selection "Rail." Recall that you can do this simply by giving an item a menu state with the value 2. We will default to the item "Rail," while affording the user the opportunity to move the check mark with a point-and-click. First we'll turn off all the other menus and move through Menucheck and Idle in the now-usual manner.

Note that this time around we define variable Menucheck as well as Itemchoice. These will allow us to keep track of what

items have been pulled down, even with multiple headers. Menuchoice will keep track of headers; Itemchoice will keep track of items.

Depending upon whether the user pulls down "Stop" or "Rail/road," we'll branch to Breaker or Infotype, respectively, by counting through the values of Menuchoice. If "Rail/road" is chosen, we'll branch to procedure Rail or procedure Road, depending on the count through values of Itemchoice. This approach is the foundation of menu-branching. It is quite easy, once you understand it.

Those procedures in our petrie dish example here only move the check mark back and forth. But that check mark moves firm-footedly, doesn't it? It is a simple matter of changing MENU states.

Trains of Thought

Listing 4 is the longest of the programs presented here, as it attempts to show menu control and branching in a meaningful way, along with a few new bells and whistles. Rest assured, however, that it is easy to understand after a few minutes of study. Also, substantial chunks of it make use of modules you have already typed. Use the cut and paste function to grab the menu list from Listing 1. You can also pilfer some of Listing 3, though alterations are needed for a couple of procedures.

Listing 3.

Creating and moving a check mark.

```
MENU 1,0,1,"Stop"
MENU 1,1,1,"Reset"
```

```
MENU 2,0,1,"Rail/road";' column 2 header
MENU 2,1,2,"Rail"  <2> in last position turns on check mark
MENU 2,2,1,"Road"
```

```
MENU 3,0,0,"' turn off all these guys
MENU 4,0,0,"'
MENU 5,0,0,"'
```

```
ON MENU GOSUB Menucheck MENU ON
```

```
Idle:
GOTO Idle
```

```
Menucheck:
Menuchoice=MENU(0)' headers
Itemchoice=MENU(1)' items underneath headers
ON Menuchoice GOSUB Breaker, Infotype
MENU Menuchoice,0,1' unhighlights menu bar
RETURN
```

```
Breaker:
MENU RESET
STOP
RETURN
```

```
Infotype:
ON Itemchoice GOSUB Rail, Road
RETURN
```

```
Rail:
MENU 2,1,2,' move check mark to item "Rail"
MENU 2,2,1,' unmoved check mark from item "Road"
RETURN
```

```
Road:
MENU 2,2,2,' move check mark to item "Road"
MENU 2,1,1,' unmoved check mark from item "Rail"
RETURN
```

(Downloaders need only capture the file.)

This may seem like a strange moment for me to tell you a little something about myself, but you should be forewarned: I am a devotee of railroads of the world. So it seemed natural that our example should deal with that topic. If you are into trains too, so much the better. If you are not, let me underscore that the objective here is to show you how to access the Toolbox through MS-Basic. I'm sure you can easily substitute your own interests for mine.

The top of Listing 4 should look quite familiar to you now. Nothing up the sleeves there. Your first question ought to come in at the WINDOW command. Rather than sending the output to the default window, we use the command to create our own. Format for the WINDOW command is as follows:

```
WINDOW <window id,[title],[dimensions][,type]> ...where
window id = identifies window (range 1-4); maximum of 4 windows
title = an optional text string argument for use with "document" windows
dimensions = screen boundaries of created window; consists of x,y coordinates
corresponding to upper left- and lower righthand corners
type = indicates type of window (range 1-4); 1 (document window); 2
(two-line "frame" border); 3 (simple one-line border); 4 (window with
shadow)
```

Note that even when a title is omitted, the quote marks must be included, as is the case with MENU. Note also the format for the dimensions of the window, which utilize standard MS-Basic form (parenthesized coordinates separated by a hyphen).

When you are finished with a window, you may or may not need to close it, using a WINDOW CLOSE command. We'll learn more about this up ahead.

As for sizing windows, well, you'll probably need a few trial and error sessions before you get a feel for them. Expect to do some tailoring once you have laid one down. Always make sure any window is big enough to handle the largest of your inputs to it.

Next we encounter the command TEXTFACE. This is very simply a means of calling up character style. Format for the command is:

```
TEXTFACE <attribute> ...where
attribute = 0 (plain text); 1 (bold); 2 (italic); 4 (underlined); 8 (outlined);
16 (shadow); 32 (condensed); 64 (extended)
```

A caveat: the documentation is wrong when it shows a format of CALL TEXTFACE <attribute>. The CALL command means something else entirely, and using it as suggested in the documentation results in a syntax error. This erratum is being redressed by Microsoft.

Anyway. We get a better look to the text in our text window by making it boldface. Then we head into our old friend ON MENU GOSUB.

The MENU method then more or less repeats itself. However, in this case there are five possible values for Menuchoice and four Itemchoice possibilities per header. Things get a little crowded, but the technique is no different from what we saw in the preceding modules.

You'll notice an extra statement in the procedures Railnames and Trackage. Here we set up a new variable, rail, to act as a flag. In the following procedures, the value of variable rail determines which text strings are printed. Remember that these are the two menu items that share a checkmark. The user can ask for two types of information from each item on the

Listing 4.

```

MENU control with branching, and a few other neat things.

MENU 1,0,1,"Stop": 'move loop breaker up onto menu
MENU 1,1,1,"Reset"

MENU 2,0,1,"Rail/road"
MENU 2,1,2,"Railname(s)": <2> in last position turns on check mark
MENU 2,2,1,"Trackage per 10,000 square miles"

MENU 3,0,1,"Americas"
MENU 3,1,1,"Argentina"
MENU 3,2,1,"Brazil"
MENU 3,3,1,"Canada"
MENU 3,4,1,"U.S.A."

MENU 4,0,1,"Europe"
MENU 4,1,1,"Britain"
MENU 4,2,1,"France"
MENU 4,3,1,"Germany"
MENU 4,4,1,"Switzerland"

MENU 5,0,1,"Asia"
MENU 5,1,1,"China"
MENU 5,2,1,"India"
MENU 5,3,1,"Japan"
MENU 5,4,1,"South Korea"

WINDOW 1,"(50,50)-(450,150),2: ' Outputs text to a custom window
TEXTFACE 1: ' Puts text into boldface
ON MENU GOSUB Menuchek:MENU ON

Idle:
GOTO Idle

Menuchek:
Menuchoice=MENU(0)' headers
Itemchoice=MENU(1)' items underneath headers
ON Menuchoice GOSUB Breaker, Infotype, Americas, Europe, Asia
MENU Menuchoice,0,1
RETURN

Breaker:
MENU RESET
STOP
RETURN

Infotype:
ON Itemchoice GOSUB Railnames, Trackage
RETURN

Americas:
ON Itemchoice GOSUB Argentina, Brazil, Canada, USA
RETURN
Europe:
ON Itemchoice GOSUB Britain, France, Germany, Switzerland
RETURN
Asia:
ON Itemchoice GOSUB China, India, Japan, Korea
RETURN

Railnames:
rail=0: ' Acts as flag
MENU 2,1,2;MENU 2,2,1: ' move check mark to item "Railnames"
RETURN

Trackage:
rail=1: ' also acts as flag to tell us which set of info to access
MENU 2,2,2;MENU 2,1,1: ' move check mark to item "Trackage"
RETURN

Argentine:
CLS PRINT "Argentina --": ' Here are the branches for each country

IF rail=0 THEN PRINT "FA -- Ferrocarriles Argentinos"
IF rail=1 THEN PRINT "233.3"
RETURN
Brazil:
CLS PRINT "Brazil--"
IF rail=0 THEN PRINT "RFFSA -- Rede Ferroviaria Federal SA"
IF rail=1 THEN PRINT "122.6"
RETURN
Canada:
CLS PRINT "Canada--"
IF rail=0 THEN PRINT "CN -- Canadian National"
IF rail=1 THEN PRINT "114.8"
RETURN
USA:
CLS PRINT "U.S.A.--"
IF rail=0 THEN PRINT "There are over 500 railnames in the U.S."
IF rail=1 THEN PRINT "542.5"
RETURN
Britain:
CLS PRINT "Britain--"
IF rail=0 THEN PRINT "BR -- British Rail"
IF rail=1 THEN PRINT "1218.6"
RETURN
France:
CLS PRINT "France--"
IF rail=0 THEN PRINT "SNCF -- Societe Nationale des Chemins de Fer Francais"
IF rail=1 THEN PRINT "1035.5"
RETURN
Germany:
CLS PRINT "Germany--"
IF rail=0 THEN PRINT "DB -- Deutsche Bundesbahn"
IF rail=1 THEN PRINT "1873.9"
RETURN
Switzerland:
CLS PRINT "Switzerland--"
IF rail=0 THEN PRINT "SBB/CFF/FFS --"
IF rail=0 THEN PRINT "Schweizerische Bundesbahnen,"
IF rail=0 THEN PRINT "Chemins de Fer Federaux,"
IF rail=1 THEN PRINT "Ferrovie Federali Svizzera"
IF rail=1 THEN PRINT "1147.4"
RETURN
China:
CLS PRINT "China--"
IF rail=0 THEN PRINT "Railways of the People's Republic of China"
IF rail=1 THEN PRINT "93.1"
RETURN
India:
CLS PRINT "India--"
IF rail=0 THEN PRINT "IGR -- Indian Government Railways"
IF rail=1 THEN PRINT "306.6"
RETURN
Japan:
CLS PRINT "Japan--"
IF rail=0 THEN PRINT "JNR -- Japanese National Railways"
IF rail=1 THEN PRINT "1168.4"
RETURN
Korea:
CLS PRINT "South Korea--"
IF rail=0 THEN PRINT "KNR -- Korean National Railroad"
IF rail=1 THEN PRINT "420.4"
RETURN

```

Switzerland--
 SBB/CFF/FFS --
 Schweizerische Bundesbahnen,
 Chemins de Fer Federaux,
 Ferrovie Federali Svizzera

Sample output.

menu. Though the approach is somewhat primitive, this is an example of how a checked menu selection can modify other selections. We could use it to control many more than two information states.

The tail end of Listing 4 consists of procedures that print out the information for each country on the menu. As stated, when rail=0, railway names are printed. When rail=1, trackage statistics are printed in the window. It's that simple.

When you run the program, notice that you can size, move, or close all the windows on the screen except for the active program window at any time during execution of the program. That's a function of the Toolbox. It is a nice idea here to close them all so that the screen is as neat as possible.

On the Button

Our final program, Listing 5, introduces a new window with pushbuttons in it to help us differentiate between East and West Germany (thought you had me on that, didn't you?). Everything prior to procedure Germany itself should now be clear to you, if you have spent a little time with the previous listings.

Within procedure Germany, we create a new text window in the same manner as before, but lower down on the screen in this case so as not to obscure the original text window. There is a way to recover obscured windows, but that is best left to a future article.

We print a message in the window, then place three buttons there, using the BUTTON command. Format for the command is as follows:

```
BUTTON button id,state[,title,dimensions[,type]] ...where
button id = identifies button (range 1 to memory limitations)
state = 0 (button dimmed and inactive); 1 (button active, but not selected); 2
(button active and currently selected)
title = text string description of button function
dimensions = Screen boundaries of created window; consists of x,y coordinates
corresponding to upper left- and righthand corners.
type = Indicates type of button (range 1-3); 1 (frame push button); 2 (check
box); 3 ("radio" button)
```

Our use of the button command in Listing 5 is pretty straightforward. Once they have been established, we hold up everything but button-pressing with a WHILE . . . WEND command. The facility of this statement is that it executes a loop as long as a given condition is true. Here we loop until a button is pressed. When one is, we branch to the appropriate subroutine.

In this instance we must close WINDOW 2, to return to normal operation of the program. Hence the statement WINDOW CLOSE 2 appears in all three subroutines—Shut, East, and West.

To add this improvement to Listing 4, copy procedure Germany with its ancillary subroutines, Shut, East, and West, and paste it into Listing 4. Don't forget to then delete the old procedure Germany. (Again, downloaders can capture a complete version of the program from Creative Computing Online.) You will then have a functional Basic program utilizing pull-down menus, windows, and pushbuttons.

That is more than enough for this time around to get you thinking about your own pull-down applications. In a follow-up piece, we'll take a look at reading the mouse and mouse button, pulling up MacPaint files, and the creation of simple graphics and sound in MS-Basic 2.0. Until then, keep on clicking! ■

Listing 5.

Creating and reading push buttons.

```
MENU 1,0,1,"Stop":'move loop breaker up onto menu
MENU 1,1,1,"Reset"

MENU 2,0,1,"Rail/road":' column 2 header
MENU 2,1,2,"Railname"':<2> in last position turns on check mark
MENU 2,2,1,"Trackage per 10,000 square miles"

MENU 3,0,1,"Button Up":' easy way to get to Germany
MENU 3,1,1,"Germany"
MENU 4,0,0,""
MENU 5,0,0,""
```

ON MENU GOSUB Menucheck-MENU ON

Idle:

```
GOTO Idle
```

Menucheck:

```
Menuchoice=MENU(0)' headers
Itemchoice=MENU(1)' items underneath headers
ON Menuchoice GOSUB Breaker, Infotype, Germany
MENU Menuchoice,0,1'unhighlights menubar
RETURN
```

Breaker:

```
MENU RESET
STOP
RETURN
```

Infotype:

```
ON Itemchoice GOSUB Railnames, Trackage
RETURN
```

Railnames:

```
MENU 2,1,2
MENU 2,2,1
rail=0 'a flag to tell us which type of info to print
RETURN
```

Trackage:

```
MENU 2,2,2
MENU 2,1,1
rail=1 'again, flags what information the user wants
RETURN
```

Germany:

```
WINDOW 2,"",100,150)-(330,260),2
PRINT "which Germany? Click your choice."
BUTTON 1,1,"East Germany", (5,25)-(200,40),1
BUTTON 2,1,"West Germany", (5,55)-(200,70),1
BUTTON 3,1,"CANCEL", (5,85)-(200,100),1
WHILE DIALOG(0)>1:WEND 'We only want to look at buttons now
Pressed=DIALOG(1):' find out which button has been pressed
IF Pressed=4 THEN GOTO Shut 'cause we're done with the window
ON Pressed GOSUB East, West
```

Shut:

```
WINDOW CLOSE 2
RETURN
```

East:

```
WINDOW CLOSE 2 ' still need to shut the window even if we've branched
```

```
CLS PRINT "East Germany--"
IF rail=0 THEN PRINT "DR -- Deutsche Reichsbahn"
IF rail=1 THEN PRINT "2152.4"
RETURN
```

West:

```
WINDOW CLOSE 2
CLS PRINT "West Germany--"
IF rail=0 THEN PRINT "DB -- Deutsche Bundesbahn"
IF rail=1 THEN PRINT "1873.9"
RETURN
```

WE UNLEASH THE WORLD'S MOST POWERFUL GRAPHICS TECHNOLOGY.

To look at Infocom stories, you'd say they're all prose. No graphics. Ah, but there's more than meets your eyes.

We draw our graphics from the limitless imagery of your imagination—a technology so powerful, it makes computer screen pictures look like



graffiti by comparison. And no one knows how to unleash your imagination like Infocom. With thrilling plots. Unpredictable situations. And original puzzles calculated to drive you out of your skull.

Step up to Infocom. All words. No graffiti. The secret reaches of your imagination are beckoning.

It's time to open your mind's eye.



INFOCOM™
INTERACTIVE FICTION SOFTWARE

Infocom's interactive fiction is available for a wide variety of personal computers.

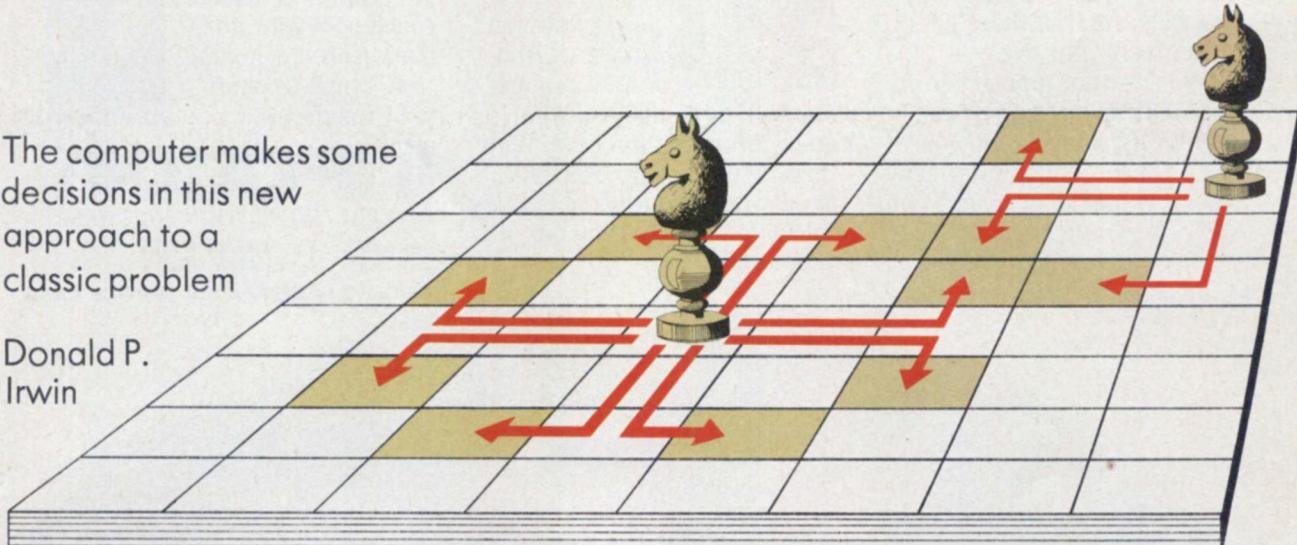
CIRCLE 114 ON READER SERVICE CARD



The Knight's Tour

The computer makes some decisions in this new approach to a classic problem

Donald P.
Irwin



Through the ages, fascination with the game of chess and its strategic plays has encouraged many types of complicated and analytical puzzles. One of these is the Knight's Tour, which over the past two centuries has interested some of the greatest minds in the fields of both mathematics and game solutions.

The problem involves the placement of a chess knight anywhere on a standard size chessboard, consisting of 64 squares in an 8x8 configuration, then moving the knight from square to square until all 64 squares have been visited once and only once. The legal move for a chess knight is two squares in a vertical or horizontal direction, then one square perpendicular to the previous square (as shown in Figure 1).

Upon being introduced to this puzzle, your first attempt at a solution might consist of placing the knight on the chessboard and arbitrarily moving it about the board. Even if you have some notion of how to move the knight around the board, you'll find that after two or three tries certain problem areas appear. If these problem areas are not eliminated as soon as possible, they may develop into problems that will eventually terminate the knight's tour.

An example of this arbitrary movement method is shown in Figure 2. The

knight's itinerary is represented by the numbers 1 to 34 with the letter K representing the knight's present position. The square labelled with the letter C indicates a probable trouble area. A trouble area is a square that has only one entry point and one exit point. If this square is not traversed when the knight lands on any of the adjacent squares, as indicated by the arrows in Figure 2, the square will end up as a termination square. A termination square is one that has only one entry point and no exit square. In the example, squares A and B are terminator squares. Obviously, if more than one of these termination squares is produced in a tour, the tour cannot be completed.

This arbitrary trial and error method will eventually produce a solution to the problem, but only after numerous tries and much backtracking. But because there is no guarantee that the itinerary will be completed from any given point, mathematicians and puzzle enthusiasts alike have tried to find different ways in which a solution could always be reached no matter where the knight starts its path.

Early Approaches

In the early 18th century, people like De Moivre, Euler, Legendre, Roget,

Figure 1. Legal moves for the knight from two positions.

Vandermonde, and Warnsdorff devised some very artistic and practical solutions to this fascinating problem. For an interesting array of these solutions, consult W. W. R. Ball's *Mathematical Recreations and Essays* (Macmillan and Company, Ltd., NY, 1905).

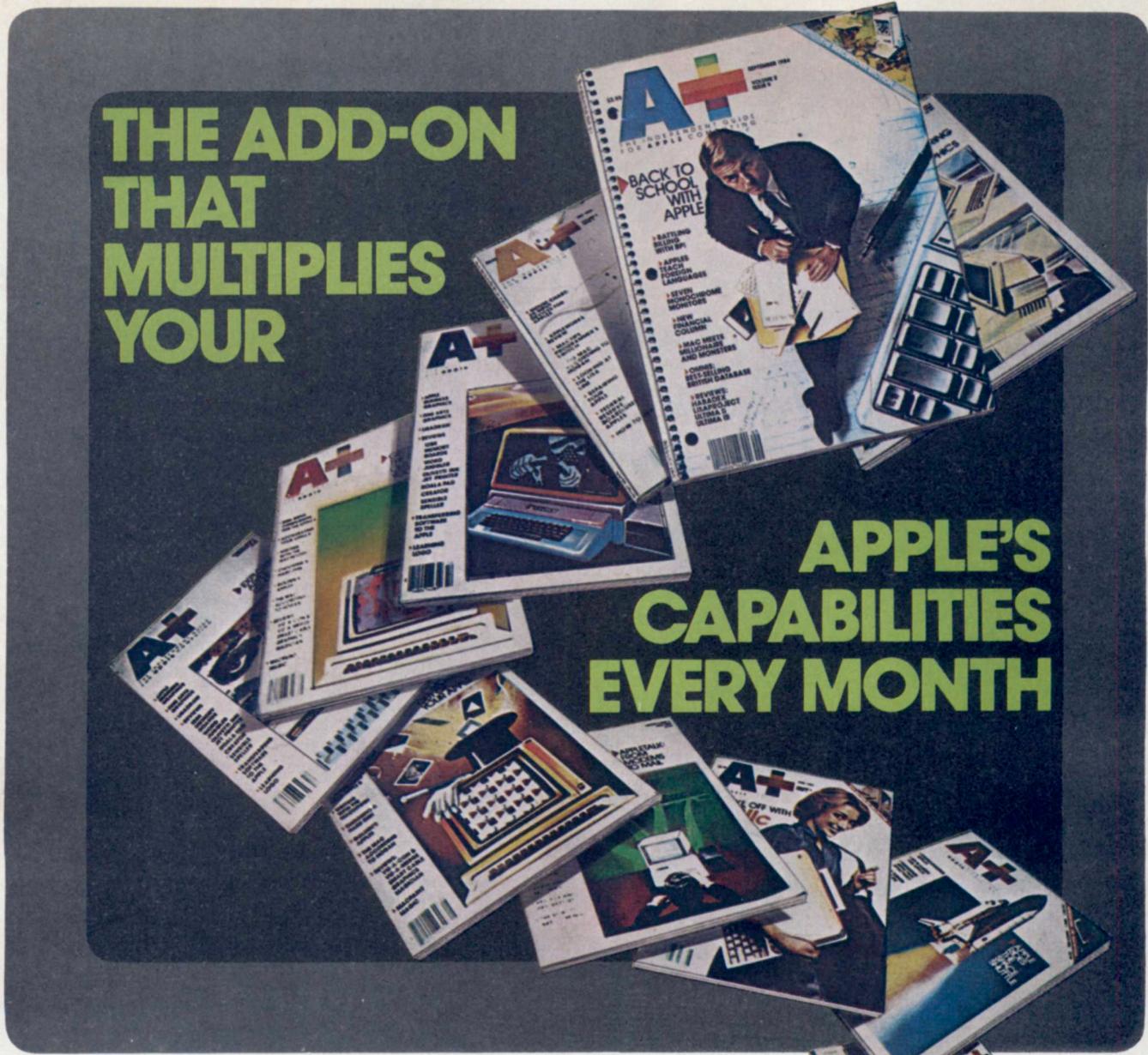
In many of the approaches discussed in that book, the author found extravagant solutions to the Knight's Tour. For example, some people were in-

3	13	11	17	B	A	32	19
10	16	4	1		18		30
5	2	14	12	31	20	33	
15	9	6			34	29	C
7			K	28	24	21	
					22	27	
					25		23
							26

Figure 2. Example of trouble spots: A and B will terminate the tour.

THE ADD-ON THAT MULTIPLIES YOUR

APPLE'S CAPABILITIES EVERY MONTH



Watch the capabilities of your Apple multiply every month when you add on A+. The Independent Guide for Apple Computing. It's compatible with every model including the Apple II, II+, IIe, IIc, III, Lisa and Macintosh.

A+ is your connection to in-depth product reviews of the newest Apple and compatible hardware, software and peripherals...innovative applications including database management, telecommunications and graphics...the hottest new games...helpful tutorials...and much, much more!

Complete and mail the attached order form today to begin your subscription to A+ the most important add-on for your Apple.

**SUBSCRIBE TODAY
AND SAVE UP TO 26%!**

A+ YES

P.O. Box 2964
Boulder, Colorado 80322

CC8Z169

I want to subscribe to A+. The Independent Guide for Apple Computing. Please enter my subscription for:

8 issues
Only \$13.97
Save 16%!

12 issues (One Year)
Only \$19.97
Save 20%!

24 issues (Two Years)
Only \$36.97
Save 26%!

New or renewal orders.

Savings based on full one-year (12 issues) subscription price of \$24.97.

Mr./Mrs./Ms. _____

(please print full name)

Company _____

Address _____

City _____ State _____ Zip _____

Check one: Payment enclosed Bill me later Charge my: American Express Visa

MasterCard Card No. _____ Exp. Date _____

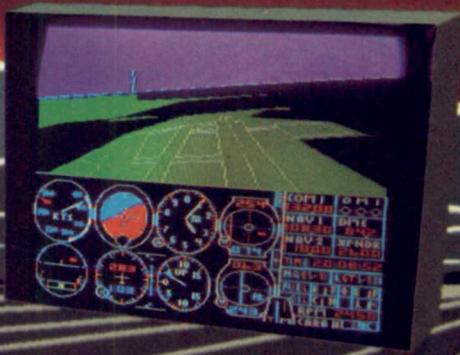
Add \$1 per issue in Canada and all other foreign countries.

Please allow 30 to 60 days for delivery of first issue.

Would you like to receive special offers from qualified users of our mailing list? Yes No

Flight Simulator II

For Apple,
Atari, & Commodore 64[®]



Put yourself in the pilot's seat of a Piper 181 Cherokee Archer for an awe-inspiring flight over realistic scenery from New York to Los Angeles. High speed color-filled 3D graphics will give you a beautiful panoramic view as you practice takeoffs, landings, and aerobatics. Complete documentation will get you airborne quickly even if you've never flown before. When you think you're ready, you can play the World War I Ace aerial battle game. Flight Simulator II features include ■ animated color 3D graphics ■ day, dusk, and night flying modes ■ over 80 airports in four scenery areas: New York, Chicago, Los Angeles, Seattle, with additional scenery areas available ■ user-variable weather, from clear blue skies to grey cloudy conditions ■ complete flight instrumentation ■ VOR, ILS, ADF, and DME radio equipped ■ navigation facilities and course plotting ■ World War I Ace aerial battle game ■ complete information manual and flight handbook.

See your dealer . . .

or write or call for more information. For direct orders enclose \$49.95 plus \$2.00 for shipping and specify UPS or first class mail delivery. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800 / 637-4983

CIRCLE 128 ON READER SERVICE CARD

subLOGIC
Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995

terested only in creating tours that would be both re-entrant and symmetrical in composition. A re-entrant tour is one in which the last square visited by the knight can lead back to the initial square in only one move. An example of this tour, which is not symmetrical in form, is shown in Figure 3.

Mathematicians were also interested in finding some arithmetic relation between the numbered squares of the completed route. Some were looking for odd and even relationships between adjacent squares or a constant sum, like 260, of squares in each row or column. This latter scheme results in a semi-magic square, in which the diagonals add up to a different sum; no solution to date has provided a perfect magic square and a complete tour of the chessboard at the same time.

J.C. Warnsdorff, a German mathematician, came close to generating all of the possible 31 million solutions. His method, called the Warnsdorff Rule or double-look-ahead, states that the knight should proceed to the square from which the number of available squares during the next two moves is the smallest. Although this rule, developed in 1823, has never been proven accurate, neither has an exception ever been found. The Warnsdorff Rule, more than any other, is useful in both locating the problem areas and providing a way for the knight to eliminate them in advance.

Computing the numbers, to be used for comparison in Warnsdorff's Rule, can be accomplished in four steps. The first step is to find each available square that is adjacent to the knight's present position; these squares are labelled with the letters I, L, and X in Figure 4.

The second step is to count the available squares that can be visited from

5	2	33	20	15	18	31	62
34	21	4	1	32	63	14	17
3	6	35	46	19	16	61	30
22	45	56	43	64	47	58	13
7	36	23	48	57	52	29	60
24	39	44	55	42	59	12	51
37	8	41	26	49	10	53	28
40	25	38	9	54	27	50	11

Figure 3. Example of a re-entrant tour.
Location 64 is one move away from location 1.

the squares labelled in step 1; all of the squares thus "adjacent" to the square labelled I are marked with the letter O. So the total number of squares is seven, as indicated by the subscript on the letter I in Figure 4. The square that the knight currently occupies is not counted.

The third step is to count the squares that can be reached from the O squares as noted in the subscripts.

The fourth step is to add up all the numbers calculated in steps 2 and 3; thus, the number computed for the I

The algorithm I developed to generate the many solutions to this puzzle uses part of Warnsdorff's Rule along with the arbitrary movement method.

square would be $7+8+6+4+3+3+4+6$ for a total of 41. The number for the L square would be $5+8+8+6+3+4$ or 34. After each of the numbers has been calculated for the remaining X labelled squares, the knight moves to the square possessing the smallest value. In this manner, Warnsdorff was able to see in advance the probable trouble areas.

With the invention of the computer, a whole new breed of people became interested in the Knight's Tour, a problem that lends itself to computer solution. Both new attempts and such modified ones as Professor Bhairav Joshi's

			O ₄		O ₃	
		O ₆			O ₅	
		X	I ₇			
	X	O ₈		X	O ₄	
	U ₈	K		O ₆		
	U ₆	X		U ₈	X	
		L ₅	X			
		U ₃		U ₄		

Figure 4. Example illustrates Warnsdorff's Rule for I and L squares.

modification of Warnsdorff's Rule (*Creative Computing*, August 1980) have emerged over the last few years. These algorithms have successfully completed the knight's itinerary, but they have neglected the ability of the computer to semi-simulate the human brain.

Past attempts by computer programmers have imposed many restrictions on the movement of the knight; each algorithm could produce only 64 different tours because there are only 64 possible starting squares on the chessboard. However, if you compare the paths generated by different algorithms, you will find that they are totally different.

By incorporating many restrictions in their algorithms, programmers have eliminated the ability of the computer to choose the knight's next move. An example of a program that determines the knight's path before it leaves its initial position is Joshi's modification of Warnsdorff's Rule. In his algorithm, Joshi decided it was better to tell the computer where to move the knight, than to allow the computer the choice of moving the knight into an incomplete tour. Warnsdorff's Rule, however, does allow the algorithm to choose the knight's next move—if there is a tie between the smallest numbers computed. Though it was never proven that this random choice could endanger a solution, Joshi decided it was better to leave it out, thereby limiting the number of routes to 64.

A New Approach

Even if the arbitrary choice were installed in the program, it would still not consider all the possible tours. The reason for this is twofold: first there are the restrictions of examining two moves in

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

Figure 5. Squares of the chessboard are numbered from left to right.

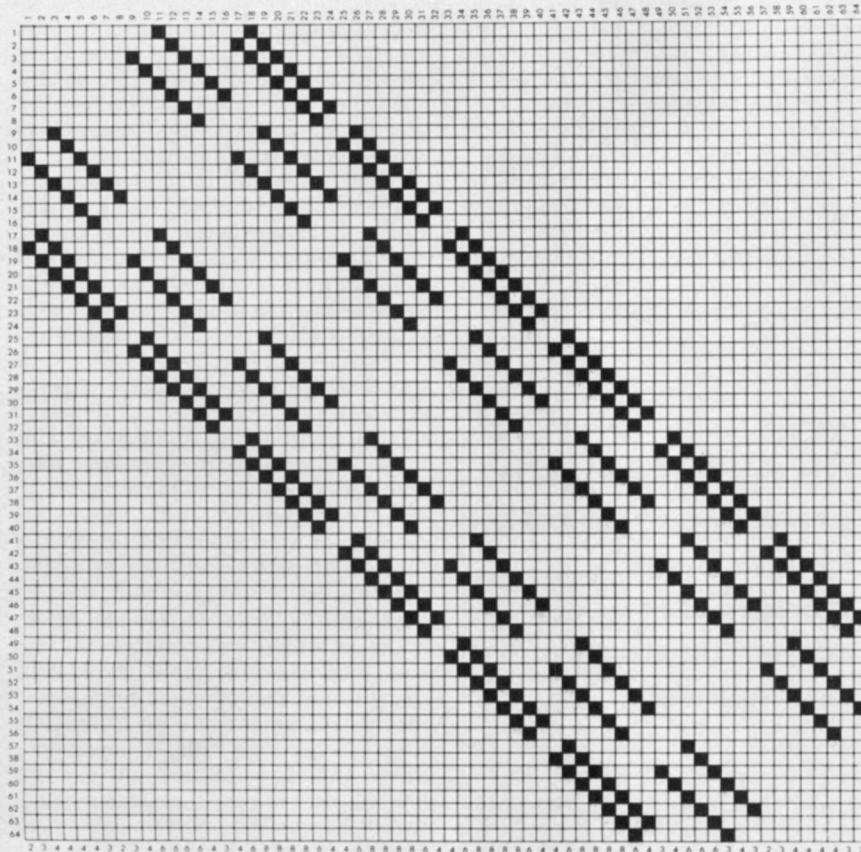


Figure 6. Tabular Form shows legal moves while column totals represent the exit value of each square.

advance, and second, the number associated with the second level adjacent squares is fixed from the start. However, the method presented here makes only one restriction and then allows the computer to make the final decision between moves. There are several methods the computer can use to make arbitrary choices between moves. The most commonly used method, and the one I have incorporated in my program, is the random number generator. Although this method alone can never simulate the indecisiveness of the human brain, it can come close if the generator is truly random in its selection of numbers.

The algorithm I developed to generate the many solutions to this puzzle, uses part of Warnsdorff's Rule along with the arbitrary movement method. I decided that looking ahead, as in Warnsdorff's Rule, was important but not as important as Joshi made it.

By looking so far in advance, Joshi guaranteed success but at the same time greatly reduced the chances of having to make an arbitrary decision. Therefore, I

decided to look at only those squares adjacent to the knight's current position. From them the algorithm picks the one with the smallest number of adjacent squares. Not only does this ensure the elimination of problem areas, but it also increases the probability that the computer will have to make a decision, thereby, producing an efficient algorithm that can generate an almost unlimited number of solutions to the Knight's Tour.

Before presenting my algorithm, I must first define and explain four terms needed to ensure the proper results. First, the chessboard (CB) is an 8x8 set of squares, each of which is labelled from left to right, starting with the number 1 in the upper lefthand corner (see Figure 5).

Second, a set that will represent the squares of the newly defined CB is Let $S = \{1, 2, 3, \dots, 64\}$. Given set S, I can define the binary relation R on S such that (a, b) is in R if and only if there is a legal move from a to b. For example, the pair $(1, 11)$ is in R, while the pair $(1, 5)$ is not in

R. Since the pair (11,1) is also in R, the binary relation R is defined as a symmetrical relation on S. This symmetrical relation permits a simpler determination of the knight's next move. The tabular form, presented in Figure 6, is the basis of the algorithm's computation.

Third, the exit value (EV) of each square on the CB is the total number of legal moves from that square at a given instance during the tour. This EV is produced by scanning the column associated with a sequence in the tabular form and counting each of the X's found as shown in Figure 6. The EV determines the knight's next move in the tour.

The process of choosing the correct square is as follows: 1.) find all of the legal squares by scanning down the appropriate column, finding the square or squares with the smallest EV. 2.) if more than one small EV exists, make an arbitrary choice. It should be noted that the reason for picking the smallest EV in step 1 is the same as described in Warnsdorff's Rule. The arbitrary choice in step 2 is what produces the different tours with my algorithm.

In summary, the algorithm is as follows:

Step 1: Create a 64×64 matrix and initialize it by placing a 1 wherever an X appears in the tabular form in Figure 6 and a 0 in the remaining squares. Create the array EV to store the 64 values described above and initialize it by using the values shown in Figure 6. Create an array CB to store the knight's moves and create the variable KMC to keep track of the knight's movement. Initialize KMC to 1.

Step 2: Zero out the matrix row corresponding to the knight's present position (KMC) and subtract 1 from every EV in which a 1 was found in the corresponding column. The reason for this subtraction is to avoid the counting of 1's in each column after every move.

Step 3: Examine the column referred to by the knight's present position (KMC) and find the available square with the smallest EV. If more than one square exists, use a random number generator to determine the next move.

Step 4: Increment the KMC by 1 and mark the proper location in the CB array with the new value.

Step 5: Repeat steps 2 through 4 until the KMC is equal to 64 (a complete tour has been found), or there are no more possible squares to which to move.

Step 6: Print out the CB array, which now contains the knight's current path through the chessboard.

47	2	21	16	33	58	23	14
20	17	48	1	22	15	34	57
3	46	19	32	59	56	13	24
18	31	44	49	38	35	60	55
45	4	39	36	61	54	25	12
30	7	50	43	40	37	64	53
5	42	9	28	51	62	11	26
8	29	6	41	10	27	52	63
17	2	27	48	15	42	29	44
26	37	16	1	28	45	14	41
3	18	49	38	47	40	43	30
36	25	56	61	50	53	46	13
19	4	35	54	39	60	31	52
24	55	22	57	62	51	12	9
5	20	63	34	7	10	59	32
64	23	6	21	58	33	8	11
5	2	23	54	21	52	17	56
24	47	4	1	58	55	20	51
3	6	59	22	53	18	57	16
46	25	48	39	60	63	50	19
7	38	45	64	49	34	15	62
26	43	28	37	40	61	12	33
29	8	41	44	31	10	35	14
42	27	30	9	36	13	32	11
33	2	29	24	25	20	17	22
28	25	34	1	30	23	36	19
3	32	27	56	59	18	21	16
26	57	64	31	48	51	60	37
63	4	55	58	61	44	15	50
10	7	62	47	52	49	38	41
5	54	9	12	43	40	45	14
8	11	6	53	46	13	42	39
37	2	19	24	35	26	17	14
20	23	36	1	18	15	34	27
3	38	21	62	25	60	13	16
22	55	40	57	64	47	28	33
39	4	63	48	61	32	59	12
54	7	56	41	58	49	46	29
5	42	9	52	31	44	11	50
8	53	6	43	10	51	30	45

Figure 7. Shows several completed tours from the same starting square. The program located 64 different tours from starting square 12.

I tested my algorithm on an old IBM 1130 computer using an outdated version of Fortran IV. I generated 20 different itineraries in three seconds of CPU time using the number generator, as compared to 4.946 seconds by Professor Joshi on an Itel AS/6 computer in APL.

I then generated 64 different tours from the same starting square in 9.6 seconds. This is compared to Professor Joshi's time of 6 seconds for 64 itineraries from different starting points. The number of different tours that may be generated and tested by my algorithm depends on the random number generator of the system. The memory of the computer should be able to store the calculations of each new tour generated for comparison with the other tours previously created by the algorithm. ■



Please let us know 8 weeks in advance so you won't miss a single issue of CREATIVE COMPUTING.

Attach your old label where indicated and print your new address in the space provided. Please be sure to include your mailing label whenever you write us about your subscription. It helps us to serve you promptly.

Write to: P.O. Box 5214, Boulder, CO 80322

- Change address only
- Extend subscription
- Enter new subscription— one year \$19.97
- Payment enclosed
- Bill me later

AFFIX OLD LABEL
If you have no label handy, print old address here:

Name _____

Address _____

City _____

State _____ Zip _____

Charge: American Express Visa MasterCard

Number _____ Exp. Date _____

Signature _____

NEW ADDRESS HERE

Name _____

Address _____

City _____

State _____ Zip _____

Add \$5 per year in Canada; \$10 per year all other foreign countries. Please allow 60 to 90 days for delivery of first issue.

MITE is Changing the Way Businesses Talk!



Is the Sales Report Ready? Then "MITE It To Me!"

With MITE, the industry's most powerful and easy-to-use data communications program, the world of on-line information is as close as your computer. With the power of MITE, you can automatically log-on to your favorite information service, and capture the information for later editing or analysis. Why bother with overnight express delivery services when you can send documents anywhere in the world in seconds. With MITE, you have the choice of several different error checking protocols including the industry

standard XMODEM protocol with CRC and Batch file capabilities. With the addition of the MITE + Terminal Emulation Module, you can turn your computer into any of over ninety different terminals including a DEC VT100, IBM 3101 or Televideo 950.

MITE is available for over 130 different computer systems (CP/M and MSDOS), including the IBM PC/XT/AT, AT&T 6300, Sanyo 555, Apple Macintosh, DEC Rainbow, Kaypro and Televideo.

Physical Address:
2615 North Monroe Street
Tallahassee, FL 32303

MYCROFT
LABS INC

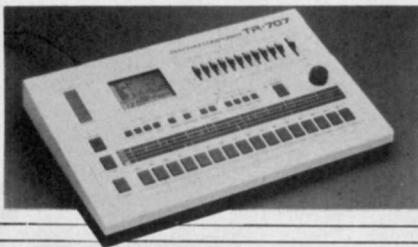
Mailing: P.O. Box 6045
Tallahassee, FL 32314
Telephone (904) 385-1141

What's New In Hardware

Russ Lockwood

Digital Drums

Roland has introduced the TR-707 Rhythm Composer, a programmable percussion synthesizer that uses digital recordings of real instruments to create 13 distinct sounds. It stores up to 998



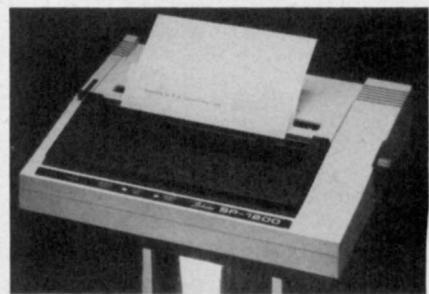
measures and uses an LCD to provide a beat-by-beat readout. Scores are saved to an audio tape recorder or on a Roland M-64C Memory Cartridge. Interfaces include MIDI, Sync 24, programmable Trigger Out, and full Tape Sync. The TR-707 carries a suggested retail price of \$595.

Roland Corp.
7200 Dominion Circle
Los Angeles, CA 90040
(213) 685-5141

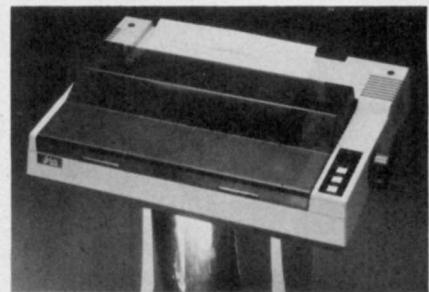
CIRCLE 407
ON READER SERVICE CARD

Sakata Printers

Sakata, well known for its quality monitors, has introduced two bidirectional dot matrix printers, the SP-1200 and the SP-1500.



The SP-1200 features 120 cps print speed, Centronics parallel port, and eight-language international character font. It supports emphasized, superscript, subscript, proportional, and graphics printing and retails for \$389.



The SP-1500 features 180 cps print speed, Centronics parallel port, international character font, 3K buffer, and 256 user-defined characters. It supports boldface, emphasized, super- and subscript, underlined and condensed printing, and retails for \$585.

Spinwriter Dot Matrix Printer

NEC Information Systems has announced the Spinwriter Elf 360 and Elf 370, 190 cps bidirectional dot matrix



printers that feature proportional spacing, bold and shadow print, and auto load.

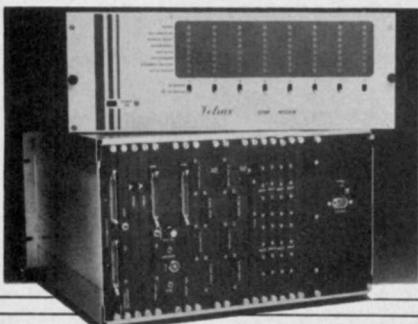
The \$595 Elf 360 connects to most personal computers, including the Apple II series, IBM PC, DEC, and Hewlett Packard computers. An optional accessory kit allows it to hook up to a Macintosh. The \$545 Elf 370 is plug compatible with the IBM PCjr.

NEC Information Systems
1414 Massachusetts Ave.
Boxborough, MA 01719
(617) 264-8000

CIRCLE 408
ON READER SERVICE CARD

Touch Tone Modem

Votrax has unveiled the DTMF Modem, a modem that converts the analog signals from touch tone telephones



into digital signals, transfers the data to a speech synthesizer, and produces audio responses. It offers Bell 407 standard compatibility, full duplex operation, and direct connection via a standard RJ11 telephone jack. The DTMF modem retails for \$700.

A demonstration is available by calling (313) 588-0181.

Votrax
1394 Rankin
Troy, MI 48083
(313) 588-2050

CIRCLE 409
ON READER SERVICE CARD

Sakata USA
651 Bonnie Lane
Elk Grove Village, IL 60007
(312) 593-3211
(800) 323-6647

CIRCLE 410
ON READER SERVICE CARD

BASF QUALIMETRIC™ FLEXYDISKS.[®] A GUARANTEED LIFETIME OF OUTSTANDING PERFORMANCE.

BASF Qualimetric FlexyDisks feature a unique lifetime warranty, firm assurance that the vital information you enter on BASF FlexyDisks today will be secure and unchanged tomorrow. Key to this extraordinary warranted performance is the BASF Qualimetric standard... a totally new set of criteria against which all other magnetic media will be judged.*

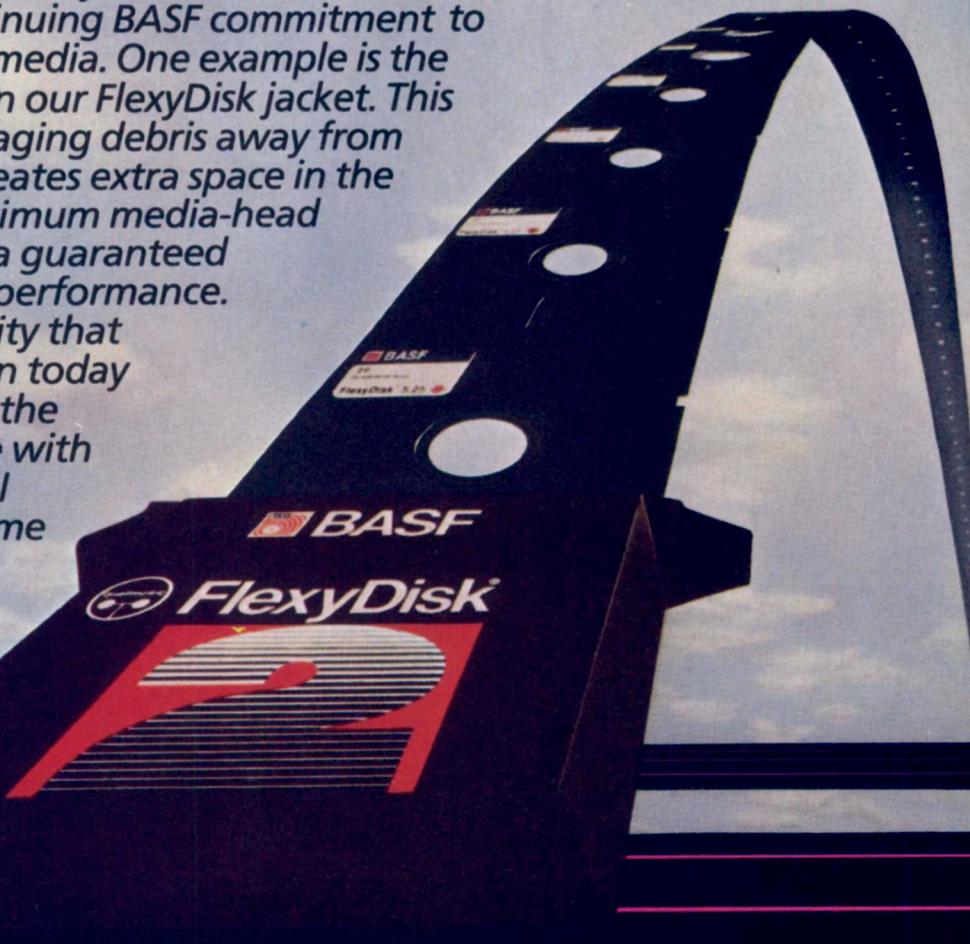
You can count on BASF FlexyDisks because the Qualimetric standard reflects a continuing BASF commitment to perfection in magnetic media. One example is the unique two-piece liner in our FlexyDisk jacket. This BASF feature traps damaging debris away from the disk's surface and creates extra space in the head access area for optimum media-head alignment. The result is a guaranteed lifetime of outstanding performance.

For information security that bridges the gap between today and tomorrow, look for the distinctive BASF package with the Qualimetric seal. Call 800-343-4600 for the name of your nearest supplier.

Visit BASF at Comdex/Spring,
Booth 650

*Contact BASF for warranty details.

CIRCLE 101 ON READER SERVICE CARD



ENTER TOMORROW ON BASF TODAY.

1983 BASF Systems Corp., Bedford, MA



BASF



Homebody.

The computer on the left is great for your home. The computer on the right is great for your home away from home.

Your office.

Introducing Apricot, Europe's most successful business computers. A full line of computers specifically designed for busi-

ness. Not adapted to it.

In fact, the facts speak for themselves.

Apricots are elegant and compact 16-bit computers. They employ the MS-DOS operating system, and a minimum of 256K memory. One of our models, the Apricot Xi, boasts an incredible

one Megabyte of memory, and features a Winchester hard disk with 20 Megabytes of storage. We also have models that feature speech recognition, full-size LCD, and icon driven menus.

In addition, you also have a choice between 9" or 12" b/w or 10" color monitors. All of which



Company Man.

have a higher screen resolution than Apple.

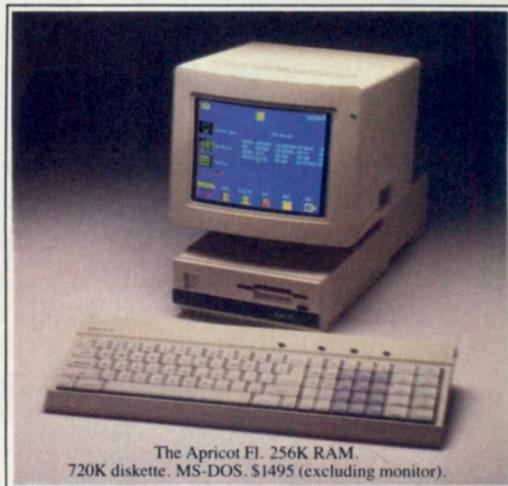
And as if all that weren't enough, all of our models can be networked from the moment you take them out of the box. They're also capable of running thousands of business software programs specially written for Apricot

on 3½ inch disks.

Which is why, for Apple, there's no place like home.

And for Apricot, there's no place like office.

Apricot, Inc., 3375 Scott Boulevard, Santa Clara, CA 95054. Call 800-227-6703, or in California 800-632-7979.



The Apricot Fl. 256K RAM.
720K diskette. MS-DOS. \$1495 (excluding monitor).

apricotTM

We're changing how
American business does business.

CIRCLE 134 ON READER SERVICE CARD

WELCOME TO APSHAI. YOU'RE JUST IN TIME FOR LUNCH.

Includes FREE Upper Reaches of Apshai™ game.



Boy, have you taken a wrong turn. One moment you're gathering treasure and the next you're being eyed like a side of beef.

You're in the world famous Temple of Apshai, the award-winning computer game that has set the standard by which other role-playing adventure games are judged.

Unlike other adventure games, your character grows stronger and more intelligent as you gain experience. You can even save your favorite character to use him in future adventures. And that might be a smart move, since it will take many tries to master the four different levels with over 200 rooms and collect the countless treasures, weapons, potions and spells scattered throughout. Along the way, you'd better watch your step — there are over 20

different types of monsters lurking about with hungry looks on their faces, all planning to make you their next meal.

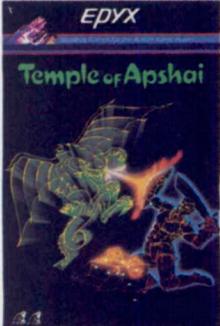
If you think it sounds challenging, you haven't seen anything yet. With every Temple of Apshai* we will be including absolutely FREE "Upper Reaches of Apshai" with four more levels, another 150 chambers and of course, a fresh supply of hungry monsters. That's enough of a challenge to keep even the most experienced game player busy for months, maybe even years.

Available at your local retailer for the Apple, Atari, Commodore 64, and IBM home computers.

*Offer applies to specially marked boxes and is available in disk format only.



Strategy Games for the Action-Game Player



What's New In Software

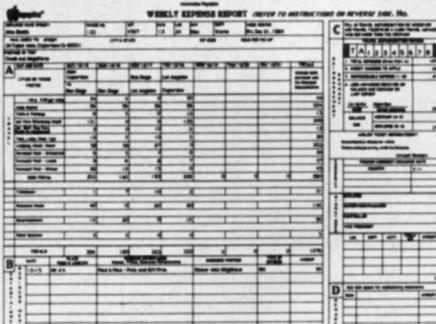
Russ Lockwood

MegaForm from MegaHaus

MegaHaus has introduced *MegaForm*, a forms and report generator for the Macintosh 512K (Fat Mac) that acts like a spreadsheet, graphics package, and database. It is completely compatible with the Macintosh Office, including the LaserWriter printer and networking capabilities. Several ready-made forms are supplied on disk. The package retails for \$295.

MegaHaus

5703 Oberlin Dr.
San Diego, CA 92121
(619) 450-1230



CIRCLE 411 ON READER SERVICE CARD

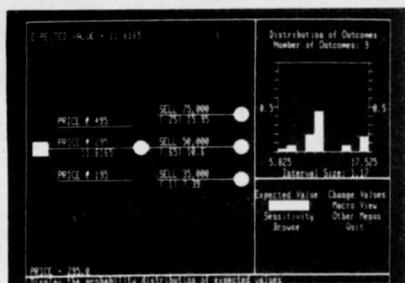
Decision Support Software from TI

Texas Instruments has released *Arborist Decision Tree*, a general purpose program for modeling and analyzing

business situations. It uses graphics to display the decision tree structure, makes use of windows, and automatically recalculates data.

Arborist Decision Tree requires a TI Professional with 512K RAM, one drive, and the three-plane graphics adapter. The retail price has not been set. A color monitor is optional.

Texas Instruments
P.O. Box 809063
Dallas, TX 75380
(800) 527-3500



CIRCLE 412
ON READER SERVICE CARD

Databases for the Home

MicroLab has announced *HomeFiler*, a database for the home requiring a 48K Apple II series computer with two disk drives. Each record can hold up to 88 fields of up to 239 characters each. *HomeFiler* sells for \$50.

MicroLab

2699 Skokie Valley Rd.
Highland Park, IL 60035
(312) 433-7550



CIRCLE 413 ON READER SERVICE CARD

Cardco has released *File Now*, a database for the Commodore 64. It holds up to 700 records per file and includes editing features. It is compatible with *Write Now*, Cardco's word processor, and retails for \$39.95.

Cardco
300 S. Topeka
Wichita, KS 67202
(316) 267-6525



CIRCLE 414 ON READER SERVICE CARD

Statistical Forecasting

Actuarial Micro Software has released two statistical packages for the Apple II series and IBM PC computers.

Monte Carlo Simulations (MCS) combines statistical analysis and business forecasting using the Chi-Square Goodness of Fit Test to match data to a standard probability distribution. It retails for \$125.

General Application Simulation System (GASS) combines up to 10 variables in one algorithm to create a statistical model and quantify risks. GASS retails for \$325. GASS and MCS together sell for \$395.

Actuarial Micro Software

3915 A Valley Ct.
Winston-Salem, NC 27106
(919) 765-5588

CIRCLE 415
ON READER SERVICE CARD

Odesta Helix

Odesta has released *Helix*, a combination database and decision support system for the Macintosh 512 (Fat Mac) and Lisa computers. It performs filing, sorting, and retrieving functions and performs complex modeling and analysis tasks. *Helix* includes sample applications and retails for \$395.

Odesta

3186 Doolittle Dr.
Northbrook, IL 60062
(312) 498-5615

CIRCLE 416
ON READER SERVICE CARD

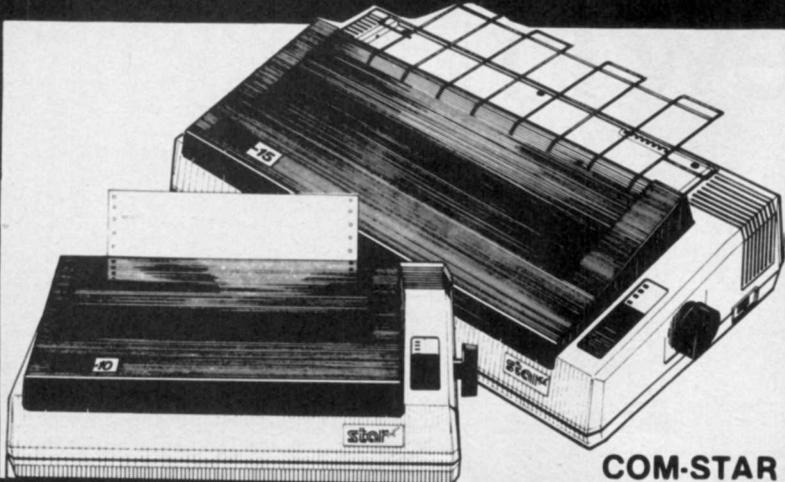
Smartcom for Mac

Hayes Microcomputer Products has adapted its *Smartcom II* communications software for the Macintosh. It supports the Hayes SmartModem 2400, a 2400/1200/300 baud modem, and uses all the graphics capabilities of the Macintosh. *Smartcom II* for the Macintosh retails for \$149.

Hayes Microcomputer Products
5923 Peachtree Industrial Blvd.
Norcross, GA 30092
(404) 449-8791

CIRCLE 417
ON READER SERVICE CARD

FANTASTIC COMPUTER PRINTER SALE!!!



COM-STAR T/F

Tractor
Friction
Printer

only \$ **169****

- Lowest Priced, Best Quality, Tractor-Friction Printers in the U.S.A.
- Fast 80-120-160 Characters Per Second • 40, 46, 66, 80, 96, 132 Characters Per Line Spacing
- Word Processing • Print Labels, Letters, Graphs and Tables • List Your Programs
- Print Out Data from Modem Services • "The Most Important Accessory for Your Computer"

**DELUXE COMSTAR T/F 80 CPS Printer \$169.00

This COMSTAR T/F (Tractor Friction) PRINTER is exceptionally versatile. It prints 8½" x 11" standard size single sheet stationery or continuous feed computer paper. Bi-directional, impact dot matrix, 80 CPS, 224 characters. (Centronics Parallel Interface).

Premium Quality 120-140 CPS 10X COM-STAR PLUS+ Printer \$199

The COM-STAR PLUS+ gives you all the features of the COMSTAR T/F PRINTER plus a 10" carriage, 120-140 CPS, 9 x 9 dot matrix with double strike capability for 18 x 18 dot matrix (near letter quality), high resolution bit image (120 x 144 dot matrix), underlining, back spacing, true lower descenders with super & subscripts, prints standard, italic, block graphics & special characters. It gives you print quality and features found on printers costing twice as much!! (Centronics Parallel Interface) (Better than Epson FX80). RATED "BEST BUY" BY CONSUMERS DIGEST BUYERS GUIDE, JANUARY 1985! List \$499.00. Sale \$199.00.

Premium Quality 120-140 CPS 15½X COM-STAR PLUS+ Business Printer \$319.00

Has all the features of the 10" COM-STAR PLUS+ PRINTER plus 15½" carriage and more powerful electronics components to handle large ledger business forms! (Better than Epson FX 100). List \$599. Sale \$319.00.

Superior Quality 15½" COM-STAR PLUS+ H.S. High Speed 160-180 CPS Business Printer \$449.00

15½" Carriage and more powerful electronic components to handle larger ledger business forms! (Serial Centronics Parallel Interface). List \$799. Sale \$449.

12" DAISY WHEEL PRINTER \$199.00

"JUKI" Superb letter quality daisy wheel printer, 12" extra large carriage, up to 12CPS bi-directional printing, drop-in cassette ribbon, (90 day warranty) centronics parallel or RS232 serial port built in! (Specify). List \$299.00. Sale \$199.00.

Superior Quality 10" COM-STAR + H.S. HIGH SPEED 160-180 CPS Business Printer \$349.00

This Super High Speed Com-Star+ Business Printer has all the features of the 10" COM-STAR+ PRINTER with HIGH SPEED BUSINESS PRINTING 160-180 CPS, 100% duty cycle, 8K Buffer, diverse character fonts, special symbols and true descenders, vertical and horizontal tabs. A RED HOT BUSINESS PRINTER at an unbelievable low price (Serial or Centronics Parallel Interface). List \$699.00. Sale \$349.00.

Printer/Typewriter Combination \$249.00

"JUKI" Superb letter quality, daisy wheel printer/typewriter combination. Two machines in one — just a flick of the switch. 12" extra large carriage, typewriter keyboard, automatic margin control and relocate key drop in cassette ribbon! (90 day warranty) centronics parallel or RS232 serial port built in (Specify). List \$399.00. \$249.00.

• 15 Day Free Trial — 1 Year Immediate Replacement Warranty

PARALLEL INTERFACES

For VIC-20 and COM-64 — \$49.00. Commodore B-128 — \$139.00. Apple — \$79.00. Atari — \$79.00.

Add \$14.50 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$29.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail!
VISA—MASTER CARD—We Ship C.O.D. to U.S. Addresses Only

PROTECTO

We Love Our Customers

Box 550, Barrington, Illinois 60010

312/382-5244 to order

COM-STAR PLUS+
Print Example:

ABCDEF1234567890
GHIJKLMNOPQRSTUVWXYZ

NEW 128K —MEGA BYTE DUAL DISK DRIVE—80 COLUMN

COMPUTER SYSTEM SALE!

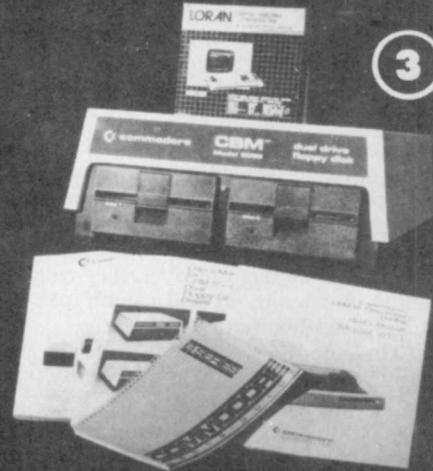
HOME • BUSINESS • WORD PROCESSING

\$795

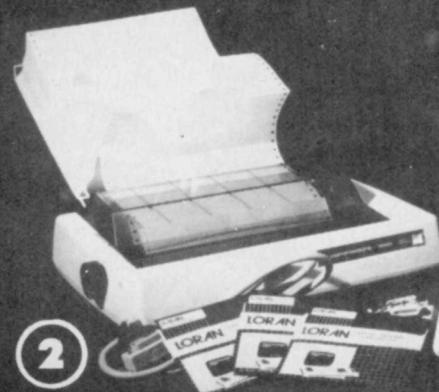
④



③



②



①

LOOK AT ALL YOU GET FOR ONLY **\$795.**

- ① B128 COMMODORE 128K 80 COLUMN COMPUTER
- ② 4023 - 100 CPS - 80 COLUMN BIDIRECTIONAL PRINTER
- ③ 8050 DUAL DISK DRIVE (over 1 million bytes)
- ④ 12" HI RESOLUTION 80 COLUMN MONITOR
 - BOX OF 10 LORAN LIFETIME GUARANTEED DISKS
 - 1100 SHEETS FANFOLD PAPER
 - ALL CABLES NEEDED FOR INTERFACING

	LIST PRICE
	\$ 995.00
	499.00
	1795.00
	249.00
	49.95
	19.95
	102.05

TOTAL LIST PRICE \$3717.95

\$795
SALE PRICE

PLUS YOU CAN ORDER THESE BUSINESS PROGRAMS AT SALE PRICES

Programmers Reference Guide
List \$29.95
Sale \$24.95

	LIST	SALE	SYSTEM
	PRICE*		PRICE*
Professional 80 Column Word Processor	\$149.95	\$99.00	\$49.00
Professional Data Base	\$149.95	\$99.00	\$49.00
Accounts Receivable	\$149.95	\$99.00	
Accounts Payable	\$149.95	\$99.00	

	LIST	SALE
Payroll	\$149.95	\$99.00
Inventory	\$149.95	\$99.00
General Ledger	\$149.95	\$99.00
Financial Spread Sheet	\$149.95	\$99.00
Order Entry	\$149.95	\$99.00

* When Bought with B128 Computer System.

★ PRINTER REPLACEMENT OPTIONS

(replace the 4023 with the following printers at these sale prices. Interface included)

★ Olympia Executive Letter Quality Printer	LIST \$699.00	SALE \$369.00
★ Comstar Hi-Speed 160 CPS 15½" Business Printer	\$779.00	\$459.00
★ Telecommunications Deluxe Modem Package	\$199.00	\$139.00
IEEE to Centronics Parallel Printer Interface	\$179.00	\$139.00

15 DAY FREE TRIAL. We give you 15 days to try out this SUPER SYSTEM PACKAGE!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!!

90 DAY IMMEDIATE REPLACEMENT WARRANTY. If any of the SUPER SYSTEM PACKAGE equipment or programs fail due to faulty workmanship or material we will replace it IMMEDIATELY with no service charge!!

Add \$50.00 for shipping and handling!!

WE DO NOT SHIP THIS SYSTEM TO FOREIGN COUNTRIES, CANADA, PUERTO RICA, ALASKA, OR HAWAII.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! We accept Visa and MasterCard. We ship C.O.D. to continental U.S. addresses only.

PROTECTO ENTERPRISES (WE LOVE OUR CUSTOMERS!)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

Escher Sketch Pad

Edward H. Carlson

The computer is a splendid toy for the mind. Play is nature's classroom, teaching adult and child alike about the possible and the impossible in this amazing universe we skate through. I hope you will join me over the next months in playing with the computer and the ideas that it can model for us.

This month we sketch some intriguing doodles. In later columns I will model the population explosion of castaways on a desert isle, help you invent planets in alternate solar systems, analyze the concepts that underlie management games—*M.U.L.E.* and Hammurabi, for example—relating them to economics, and help you build many other computer toys. Please write to me at *Creative Computing* if you have ideas you would like to contribute.

Escher and the Arabs

Among the many fascinating drawings of Maurits Cornelis Escher are some that tile all space with interlocking figures—angels and devils, birds and fish, horsemen, lizards, and various grotesque monsters. The figures not only fill plane space, leaving no gaps and by repetition extend to infinity, but often are related to one another by certain rotation and reflection symmetries.

Islamic artists (forbidden to represent life forms in their art) created many such tilings with purely geometric forms of intricate design. Escher in his travels studied the Arabic decorations of the Alhambra palace in Granada, Spain (the palace in which Isabella and Ferdinand met with Columbus and approved his plan to sail west to the Indies).

Grab pencil and paper and try to sketch a simple Escher-like drawing—maybe a side view of a cat standing with all four feet showing and legs intertwining with those of another cat, upside down and facing the other way. You find yourself struggling to interlock the figures properly. Now load the program in Listing 1 and draw on the screen. Auto-

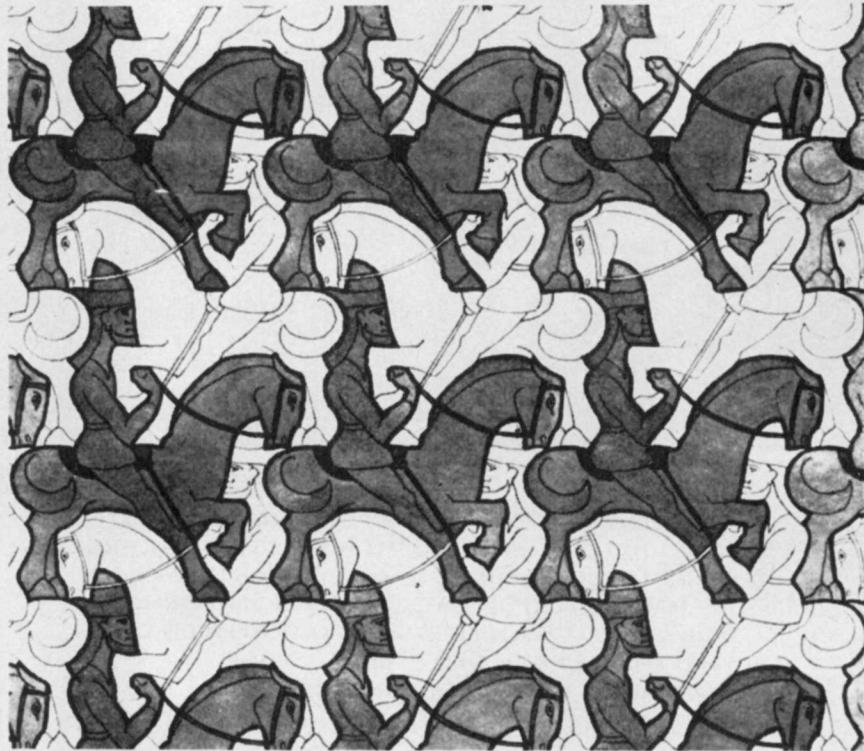


Figure 1. Escher's "horseman."

matically the figures related by symmetry to the one you are drawing appear on the screen so you can detect any gaps and overlaps immediately. Unless you are somewhat artistic and very patient, you may not produce a satisfactory Escher-like interlocking drawing at all.

OK then, dream you are the architect for a Moorish sultan's harem, and design intricate tile patterns of high symmetry. In either case, borrow or buy a book of Escher's work and analyze the drawings in light of what the computer program shows you about symmetry in the tiling task.

Staring at the Harem Floor

The theory of tiling (tesselation) needs only a few concepts.

An outline, called the *unit cell*, must fill the plane when you lay copies of it side by side—no gaps, no overlaps, and all cells oriented the same way. That is, you slide one cell (without letting it twist) by its own length to get a neighboring cell. Such a sliding is called a *translation*.

"But" you say, "how about the common bathroom tile of octagons and squares—two dissimilar shapes that together tile the plane?" All such composite outlines as well as irregular outlines like Escher's "horseman" (Figure 1) can be included by adding inner structure to the basic outlines: parallelogram, rectangle, square, and hexagon.

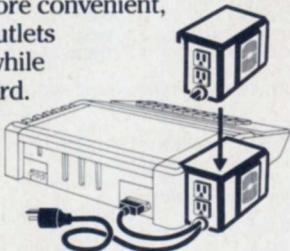
The cells rarely show up in the final drawing explicitly. To detect a cell you

CLOSE TO 1/4 MILLION APPLE II'S SAVED

SYSTEM SAVER® from Kensington Microware quietly protects close to $\frac{1}{4}$ million Apple® II's every day. Often referred to as "the piece Apple forgot," System Saver's unique combination of features have made it the most versatile, most convenient, best selling accessory ever made for the Apple.

System Saver organizes your power needs.

To make your Apple system more convenient, System Saver provides extra outlets for your monitor and printer, while replacing the Apple's power cord. One front-mounted power switch controls your whole system.



System Saver solves power line problems.

Impurities in the power supply cause 70-90% of all microcomputer malfunctions. Line noise can be interpreted as data, confusing your Apple and causing annoying system errors. Power surges and spikes can do costly damage to your computer's delicate circuitry.

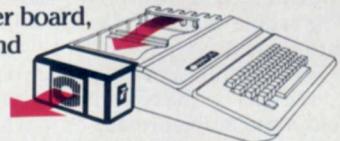
System Saver clips surges and spikes at a safe level and filters out line noise. It makes your Apple more accurate, more efficient and more reliable.

System Saver keeps your Apple cool.

Peripheral cards added to your Apple not only generate heat, they block any natural air flow through the computer. The resulting high temperature conditions can potentially shorten the lives of both your Apple and your peripheral cards.



System Saver's quiet fan draws a breath of fresh air across the Apple's mother board, over the power supply and out the side ventilation slots at the rate of 17 cubic feet per minute.



Available at your local dealer or from Kensington.

Please send _____ SYSTEM SAVER(S), \$89.95 each. Total \$_____.
Include \$3.00 for shipping and handling. Check enclosed
New York State residents add sales tax. Visa MC

Card No. _____ Expires _____

Name on Card _____

Name _____

Address (UPS delivery) _____

City _____ State _____ Zip _____ Phone _____
Kensington Microware Ltd., 251 Park Avenue South, NY, NY 10010
(212) 475-5200 Fax: 467383 KML, NY

 **KENSINGTON**
MICROWARE

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Also available in 220/240 Volts, 50/60 Hz.
Trademarks: Apple/Apple Computer, Inc., System Saver/Kensington Microware Ltd. © 1985 Kensington Microware Ltd.

CIRCLE 115 ON READER SERVICE CARD

TRY THIS!

must reconstruct it by marking repeated elements with a dot and then joining the dots by lines. For example, dot the tip of the front hoof of every white horse in the Horsemen drawing. The infinite set of dots you get is called the *lattice*. Now connect four adjacent dots and you will see the rectangular unit cell. The cell for a given drawing is unique in size and shape, but not in location. If you choose to dot the chin of each black warrior you would get the same set of rectangular cells, but displaced from the "hoof" cells.

Added to the lattice of cells are three kinds of symmetry elements: rotations, reflections, and glides. The requirement that no overlaps or gaps be present in the tiling of the plane can be satisfied in exactly 17 combinations of cell shape and symmetry elements. These are called the 17 plane space groups, and each is named with a special symbol (see lines 2316 through 2348 of Listing 1). In these symbols, p stands for primitive cell (having lattice points at the corners of the cells only) and c for centered, having also a lattice point in the center of each cell. The numbers stand for n-fold rotation axes, m for mirror planes, and g for glide planes.

N-fold axes of rotation are important in many of Escher's drawings. Only values of $n = 2, 3, 4, 6$ are allowed by mathematical consistency with the tiling idea. ($N = 1$ means no rotations at all.) By a "two-fold axis" we mean this: Taking an axis perpendicular to the paper, you rotate the drawing by one half a turn. The whole plane of figures will rotate into coincidence with itself.

A two-fold axis does not impose any conditions on the cell shape, but a four-fold axis can be present only when the cell is a square, and then only at the corners or center of the square. Likewise, a three-fold or six-fold axis requires the cell be hexagonal in shape.

Look for reflection planes in Escher's drawings. Holding a pocket mirror perpendicular to the page and moving it around, you may find a spot where the reflection in the mirror exactly matches the part of the drawing you see if you remove the mirror. If so, draw a line along the base of the mirror and you have marked a reflection plane. Planes tiled with oblique cells (non-rectangular parallelograms) cannot have reflection planes.

You can also detect the presence of reflection planes by just eyeballing the drawing. A symmetric figure, such as the front view of a soldier standing at attention, has a reflection plane (line, really) as the midline from head to toe. Non-symmetric figures that occur in pairs related like the right and left hand of a glove have a reflection plane half way between them if the line joining equivalent points (tip of each thumb) is perpendicular to the reflection plane. (If not, you

have a glide plane.)

Glide planes are a combination of reflection and translation that have no counterpart in everyday life. The horsemen drawing of Escher shows the presence of a glide plane in this way: Each horseman is a mirror image in form (related as right glove to left glove) of one facing the other way (of opposite color) but is not correctly placed to be a mirror image. In fact, each horseman is a mirror image "glided" by a half cell height from the mirror position.

Escher colored his tile prints so the viewer could distinguish each figure from its neighbors. Ignore the colors when saying that one figure reflects, rotates, translates, or glides into another.

More about cell shapes: Symmetry does not restrict the proportions of

Glide planes are a combination of reflection and translation that have no counterpart in everyday life.

Listing 1. Escher Sketch Pad.

```
1 GOTO 2000: ====== ESCHER SKETCH PAD ======
2 REM file name:ESCHER           disk name:CC          E. H. Carlson
100 REM ====== main loop =====
120 ON G GOSUB 410,420,430,440,450,460,470,480,490,500,510,520,530,540,550,560
,570
130 GOSUB 200                   :REM user draws
140 GOTO 120                   :REM plot points
200 REM ====== get dot for screen =====
205 X1=X:Y1=Y                   :REM save dot to erase
210 CH$=INKEY$: IF CH$="" THEN 210 :REM get keyboard command
211 IF CH$="Q" THEN WIDTH 80:END :REM restore screen and end
212 IF CH$= " " THEN 249         :REM toggle to other draw modes
220 IF CH$="I" THEN Y=Y-1:IF Y<-A2 THEN Y=Y+A :REM up, don't go off screen
221 IF CH$="M" THEN Y=Y+1:IF Y> A2 THEN Y=Y-A :REM down
222 IF CH$="J" THEN X=X-1:IF X<-B2 THEN X=X+B :REM left
223 IF CH$="K" THEN X=X+1:IF X> B2 THEN X=X-B :REM right
240 IF M<3 THEN RETURN         :REM plot or erase all sym dots
241 PSET(X1+W2,Y1+H2),0:PSET(X+W2,Y+H2):GOTO 200:REM erase old, move new dot
249 LOCATE 2,2                  :REM move cursor to upper left
250 M=M+1:IF M>3 THEN M=1       :REM toggle to other draw modes
251 IF M=1 THEN E=3:PRINT "DRAW":RETURN :REM draw mode
252 IF M=2 THEN E=0:PRINT "ERASE":RETURN :REM erase mode
253 IF M=3 THEN PRINT "MOVE":GOTO 200 :REM move mode
350 REM ====== print dot in all cells =====
352 PSET(XX+W2,YY+H2),E         :REM put original      dot on screen
354 X2=XX-A2 :IF XX<0 THEN X2=XX+A2 :REM put left      dot on screen
356 PSET(X2+W2,YY+H2),E         :REM put upper left   dot on screen
358 X3=XX-A2+AC:IF XX<0 THEN X3=X3+A
360 Y2=YY-B2 :IF YY<0 THEN Y2=YY+B2:X3=X3-2*AC
362 PSET(X3+W2,Y2+H2),E         :REM put upper center dot on screen
364 X4=XX+AC
366 Y2=YY-B2 :IF YY<0 THEN Y2=YY+B2:X4=X4-2*AC
368 PSET(X4+W2,Y2+H2),E:RETURN :REM put upper center dot on screen
410 REM ----- no symmetry
411 XX= X :YY= Y :GOSUB 350:RETURN :REM plot original points
420 REM ----- two-fold axis
421 XX= X :YY= Y :GOSUB 350 :REM plot original points
424 XX=-X :YY=-Y :GOSUB 350:RETURN :REM 2-fold rotation
430 REM ----- reflection plane
431 XX= X :YY= Y :GOSUB 350 :REM plot original points
435 : YY=-Y :GOSUB 350:RETURN :REM reflection
440 REM ----- glide plane
441 XX= X :YY= Y :GOSUB 350 :REM plot original points
442 XX= X+A4:YY=-Y :GOSUB 350:RETURN :REM glide plane
450 REM ----- centered cell
451 XT= X :YT= Y :GOSUB 430 :REM reflection plane
452 X= X+A4:Y =-Y+H4:GOSUB 430 :REM glide plane
456 X= XT :Y= YT :RETURN :REM restore X,Y and return
460 REM ----- 2 reflection planes
461 : GOSUB 420 :REM two fold axis implied
462 XX= X :YY=-Y :GOSUB 350 :REM first reflection
465 XX=-X :YY= Y :GOSUB 350:RETURN :REM second reflection
470 REM ----- reflection and glide
471 : GOSUB 420 :REM two fold axis implied
472 XX= X :YY=-Y+H4:GOSUB 350 :REM reflection
478 XX=-X :YY= Y+H4:GOSUB 350:RETURN :REM glide
480 REM ----- 2 glide planes
481 : GOSUB 420 :REM two fold axis implied
482 XX= X+A4:YY=-Y+H4:GOSUB 350 :REM first glide
```

rectangular or oblique cells, nor the angle in oblique cells. In fact, a rectangular or oblique cell could "accidentally" be square in shape. Each cell contains an integer number of complete figures. (A figure often extends outside the boundaries of the cell. If so, there must be an equivalent part extending into the cell from one corresponding figure in another cell.)

The Dancing Dots

The program is written in Basic on an IBM PC. I have been careful to keep the program as free as possible from special features of the IBM, and hope you can adapt it easily to your computer. Apple and Commodore machines, and Atari and Radio Shack machines using Microsoft Basic, can accept this program with only a few lines changed. I have kept the program simple. It uses the medium resolution black and white screen, and the I, J, K, and L keys to move the cursor for drawing. You may want to use color, low or high resolution, arrow cursor keys, or other special features of your own machine.

Lines 400 to 599 of the program are its geometrical heart and can be moved unchanged to any computer. Each of the 17 space groups is generated by a few lines of code giving the x and y coordinates of all equivalent points in a given cell.

In lines 350 to 399, the dots are written on the screen for four complete cells. One cell has its upper left lattice point in the center of the drawing, and from this point you move the dot that draws the figure. For other computers, you may need to change the PSET command to a PLOT or use a LOCATE or similar manner of putting a dot or character on a specified part of the screen.

Lines 200 to 299 let the program user move the dots around on the screen, and erase dots. These lines can in principle be moved to any other computer, but some changes may have to be made, such as changing the INKEY\$ construction of the IBM to a GET or INPUT.

For low symmetry cases, the program is moderately fast. You can input about five points per second. But when you are drawing high symmetry diagrams in which the computer must compute the location of up to 48 points for each point you input, and place them on the screen, the pace slows to about one point per second.

Enjoy the program. May all your figures interlock, on the screen and as you skate through life. ■

```

486 XX=-X+A4:YY= Y+H4:GOSUB 350:RETURN :REM second glide
490 REM ----- centered cell
491 XT= X :YT= Y :GOSUB 460 :REM reflection
492 X = X+A4:Y = -Y+H4:GOSUB 460 :REM glide plane
496 X = XT :Y = YT :RETURN :REM restore X,Y and return
500 REM ----- 4-fold axis
501 XX= X :YY= Y :GOSUB 350 :REM plot original points
502 XX=-X :YY=-Y :GOSUB 350 :REM half turn
504 XX=-Y :YY= X :GOSUB 350 :REM quarter turn
506 XX= Y :YY=-X :GOSUB 350:RETURN :REM reverse quarter turn
510 REM ----- 4-fold and reflection
511 XT= X :GOSUB 500 :REM 4-fold axis points
513 X = -X :GOSUB 500 :REM reflect
514 X = XT :RETURN :REM restore X,Y and return
520 REM ----- 4-fold and glide
521 XT= X :YT= Y :GOSUB 500 :REM 4-fold axis points
523 X = -XT+L4 :REM glide plane
524 Y = YT+L4 :GOSUB 500
525 X = XT :Y = YT :RETURN :REM restore X,Y and return
530 REM ----- 3-fold axis
531 XX= X :YY= Y :GOSUB 350 :REM plot original points
533 XX= X*CO+Y*SI :GOSUB 350 :REM rotate by 120 degrees
534 YY= -X*SI+Y*CO :GOSUB 350
535 XX= X*CO-Y*SI :GOSUB 350 :REM rotate by -120 degrees
536 YY= X*SI+Y*CO :GOSUB 350:RETURN
540 REM ----- 3-fold with reflections
541 XT= X :GOSUB 530 :REM plot original points
542 X = -X :GOSUB 530 :REM reflect in vertical plane
545 X = XT :RETURN :REM restore X and return
550 REM ----- 3-fold with reflections
551 YT= Y :GOSUB 530 :REM plot original points
552 Y = -Y :GOSUB 530 :REM reflect in horizontal plane
555 Y = YT :RETURN :REM restore Y and return
560 REM ----- 6-fold
561 XT= X :YT= Y :GOSUB 530 :REM plot original points
562 X = -XT*CO+YT*SI :GOSUB 530 :REM rotate by 60 degrees
563 Y = -XT*SI-YT*CO :GOSUB 530
565 X = XT :Y = YT :RETURN :REM restore X,Y and return
570 REM ----- 6-fold with reflections
572 YU= Y :GOSUB 560 :REM plot original points
573 Y = -YU :GOSUB 560 :REM reflect
575 Y = YU :RETURN :REM restore Y and return
2000 REM ===== variables and arrays =====
2110 W=320 :H=200 :REM screen width and height
2111 W2=W/2 :H2=H/2:W4=W/4:H4=H/4 :REM half screen sizes
2112 R =W*.85:R2=R/2:R4=R/4 :REM oblique cell size
2113 L =200 :L2=L/2:L4=L/4 :REM cell size
2120 X =0 :Y =0 :REM start drawing in center of screen
2130 PI=3.141593
2134 C =L4 :D =L2*SIN(PI/3) :REM triangular cell positions
2135 SI=SIN(PI/3) :CO=-.5 :REM sin and cos of 120 degrees
2140 M =1 :E =3 :CH$="" :REM initially--draw mode
2200 REM ===== initial screen =====
2210 CLS:PRINT:PRINT:PRINT :REM clear screen
2215 PRINT " ESCHER SKETCH PAD": PRINT:PRINT
2220 PRINT" PRESS CAPS LOCK": PRINT
2222 PRINT" CHOOSE SYMMETRY FROM MENU": PRINT
2224 PRINT" I, J, K, M KEYS TO MOVE DOT": PRINT
2226 PRINT" SPACE BAR TO TOGGLE DRAW TO NO DRAW MODE":PRINT
2228 PRINT" PRESS Q KEY TO QUIT": PRINT:PRINT
2230 PRINT" (PRESS SPACE BAR TO CONTINUE)": PRINT
2235 CH$=INKEY$:IF CH$="" THEN 2235
2300 REM ===== user initial input =====
2310 CLS:PRINT:PRINT:PRINT :REM clear screen
2314 PRINT " PICK THE SYMMETRY":PRINT
2316 PRINT " 1 OBLIQUE p1
2318 PRINT " 2 OBLIQUE 2-FOLD AXIS p211
2320 PRINT " 3 RECTANGULAR REFLECTION PLANE p1m1
2322 PRINT " 4 RECTANGULAR GLIDE PLANE p1g1
2324 PRINT " 5 RECTANGULAR CENTERED & 2 PLANES c1m1
2326 PRINT " 6 RECTANGULAR TWO REFLECTION PLANES p2mm
2328 PRINT " 7 RECTANGULAR REFLECTION AND GLIDE p2mg
2330 PRINT " 8 RECTANGULAR TWO GLIDE PLANES p2gg
2332 PRINT " 9 RECTANGULAR CENTERED TWO REFLECTION c2mm
2334 PRINT " A SQUARE 4-FOLD AXIS p4
2336 PRINT " B SQUARE REFLECTION PLANES p4mm
2338 PRINT " C SQUARE REFLECTION AND GLIDE p4gm
2340 PRINT " D HEXAGONAL 3-FOLD AXIS p3
2342 PRINT " E HEXAGONAL REFLECTION PLANES p3m1
2344 PRINT " F HEXAGONAL REFLECTION PLANES p31m
2346 PRINT " G HEXAGONAL 6-FOLD AXIS p6
2348 PRINT " H HEXAGONAL 6-FOLD AND REFLECTIONS p6mm
2360 Y$=INKEY$:IF Y$="" THEN 2360 :REM user makes choice
2361 G=ASC(Y$)-48:G=G+7*(G>9) :REM change input to number
2370 A2=R2:B2=H2:A=R:B=H:AC=0:AC=R4 :REM rectangular cells
2371 IF G<3 THEN AC=20 :REM oblique
2372 IF G>10 OR G=11 OR G=12 THEN A2=L2:B2=L:B=L:AC=0 :REM square
2373 IF G>12 THEN A2=L2:B2=D :A=L:B=D*2:AC=L4 :REM triangular
2390 SCREEN 2,0:CLS:WIDTH 40 :REM medium res. color screen, clear
2399 GOTO 100 :REM begin drawing
9998 REM Other computers: use GET and PLOT for INKEY and PSET
9999 REM Not direct substitutions--see reference manual

```

IBM IMAGES

Notes on the AT and hard disk subsystems

Will Fastie

It's a bird! It's a plane! Well, it sounds like a plane, anyway. That is, my new computer sounds like a plane, and a loud jet plane at that. But I'm getting ahead of myself: this is the end of the story. Let's start at the beginning.

A little over a month ago, *PC Tech Journal*'s first PC/AT arrived. About two weeks ago, it was installed on my desk, and my aging(!) XT was passed on to a new member of the staff. The beginning of the story is therefore about IBM's so-called Advanced Technology Personal Computer, aka the IBM PC/AT.

If you want to know everything there is to know about the AT (well, just about everything), take a look at the December issue of *PC Tech Journal*. The description here is from a different point of view: I'm pretending to be just an ordinary, mortal, end-user, installing my new computer. In fact, I try to be more than an end-user because I ask my local ComputerLand *not* to install or otherwise check out the equipment we buy from them. Instead, I like to open the boxes myself, see how IBM packages and what's actually in the box, and see just how hard it is to figure out what to do.

The AT is surprising in this way. I expected about the same level of difficulty normally associated with installation of a regular PC or XT, but the AT is simpler. Furthermore, IBM has included two charts, poster-like affairs that have the major points of installation called out along with pointers to the documentation for more complete explanations. The charts cover all the bases—at least in the context of the time frame in which the AT was announced (more on this in a minute).

IBM has cleverly packaged the documentation in an attempt to get the installer to look at it. The books (Guide to Operation, Installation and Setup, Basic) and the charts come in a separate box along with the power cord; the box is marked "Open this box first!" Yes, you can reach right past the books for the cord, but at least you see the books and charts and therefore might understand that they might be helpful. In fact, it is important to open at least the Guide to Operations because that is where the

Diagnostics disk is found; it is a most important player in the setup of an AT.

Once the documents have been found, the charts guide you through the setup process. One chart has the necessary instructions for the installation of internal options (boards, etc.). At least one option, a display adapter, needs to be added, and the battery needs to be connected, so these instructions are important. The second chart has the basic setup instructions for cabling and startup.

A significant improvement over prior PCs exists on the AT. In short, the DIP switches on the system board have been removed and replaced by battery operated memory. There are only two physical switches that need be considered, one inside the unit and one outside. Inside, a slide switch is used to tell the system which type of display will be the default. I'm not sure why this couldn't have also been put in memory, and it did prove to be the only point of confusion I encountered during the setup; I installed neither the IBM Monochrome nor the IBM Color/Graphics (CGA) adapter, the only two options documented. Outside, a switch on the power supply comes set to 230 volts and must be reset to 115. I found that curious, because IBM told me that the plant in Boca Raton builds only for North America, so I would expect the default to be 115. ATs for Europe are

built in Scotland.

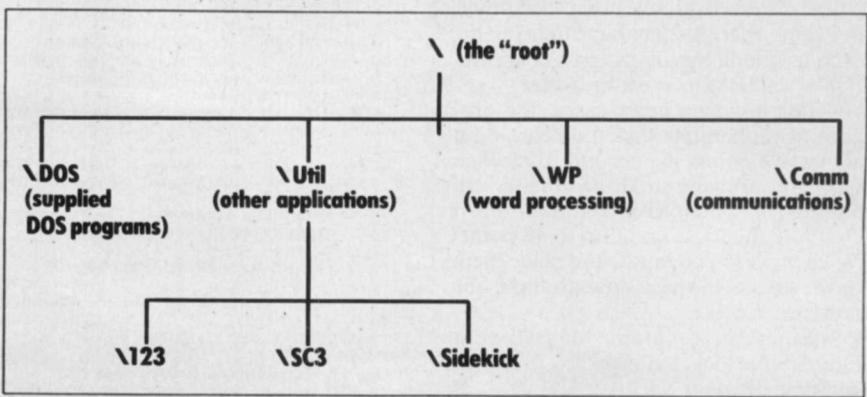
My big installation confusion came over the IBM Enhanced Graphics Adapter. When the AT was announced, only the two original adapters were available from IBM, and the installation documentation reflects this fact. I was quite confused about how to set the internal switch, and neither the AT documents nor the pile of paper that came with the EGA could bail me out.

I finally decided that the EGA could be considered a color adapter, so I set the switch accordingly. I plan some further experimentation to determine the effect of the switch; as it stands now, most of the software I use thinks a color board is installed and uses color, even if I prefer otherwise.

Connecting the battery is simple, but a flashlight is helpful to find the pin connector on the system board. The plug on the little cable is keyed, which means that it will fit only one way. Once connected, you can forget about it until the battery dies. The battery itself is about the size of a Zippo cigarette lighter and is attached to the rear of the cabinet by a Velcro strip. The battery *must* be installed to set the system configuration properly.

Once everything is installed and cabled, the next step is to turn on the system and boot the diagnostics disk. It is a good idea to run the diagnostics, but the

Table 1. Typical Directory Structure. The root directory contains AUTOEXEC.BAT, CONFIG.SYS, COMMAND.COM, and a few other files which must reside in the root. Otherwise, it is kept as empty as possible for neatness.



THE WORLD'S MOST COMPLETE REFERENCE AND SOURCEBOOKS FOR MICROCOMPUTERS!



If you own or use a microcomputer, and you're in the market for new software, peripherals, and add-ons, you need current information that will help you make the right decisions at the right prices.

If you're new to microcomputing, you need a guidebook that will help you understand what's available on the market and what services will help you choose the right system at the right price.

No matter who you are, you need the guides and sourcebooks that both experts and beginners turn to—you need a Ziff-Davis Computer Buyers Guide!

A+ BUYERS GUIDE

For the most complete and current listing of over 3,000 software, hardware, peripherals, services and organizations for the Apple II series, III, Lisa and Macintosh! Published twice a year so it's always timely, A+ BUYERS GUIDE is the definitive source for Apple computing needs and services. \$5.95.

PC BUYERS GUIDE

This is the reference guide for all IBM PC, PCXT, PCjr, PCAT and compatible owners and users. Published every 3 months, there is no other guide as complete or timely as PC BUYERS GUIDE! Updated quarterly to reflect the newest changes and innovations in IBM PC technology, PC BUYERS GUIDE brings you full listings on products, software, services, add-ons and compatibility requirements. \$7.95

CREATIVE COMPUTING SOFTWARE BUYER'S GUIDE

A comprehensive buyer's guide to the leading software and application packages for Apple, Atari, Commodore, TRS-80, and IBM microcomputers. Complete listings, compatibility specifications and performance reviews covering over 1,000 business, education, personal and recreational programs and packages. \$3.95

FOR FASTER SERVICE
PHONE TOLL FREE 1-800-631-8112
(In NJ only 1-201-540-0445)

From the publishers of A+, PC, PC TECH JOURNAL, PC WEEK and CREATIVE COMPUTING.

CREATIVE COMPUTING BUYER'S GUIDE TO PERSONAL COMPUTERS AND PERIPHERALS

If you want to buy your first system or expand your current system, don't make a decision without consulting this buyer's guide! You'll be provided with complete reviews on the leading microcomputers and peripherals on sale today. Compiled by the editors of CREATIVE COMPUTING, the #1 magazine of computer software, applications and evaluations. \$3.95

ZIFF-DAVIS PUBLISHING COMPANY

DEPT. MH3F, 39 EAST HANOVER AVENUE, MORRIS PLAINS, NJ 07950

Please send me the Buyers Guide listed below:

Title	Qty.	Price Each	Postage Handling	Total Price
A+ BUYERS GUIDE		\$5.95*	\$1.55	
PC BUYERS GUIDE		\$7.95*	\$1.55	
CREATIVE COMPUTING SOFTWARE BUYER'S GUIDE		\$3.95**	\$1.00	
CREATIVE COMPUTING BUYER'S GUIDE TO PERSONAL COMPUTERS & PERIPHERALS		\$3.95**	\$1.00	

Please add applicable sales tax:

*Residents of CA, CO, CT, DC, FL, IL, MA, MI, MO, NJ and NY State. **Residents of CA, NJ and NY State.

Payment Enclosed \$_____ (Outside USA add \$1.50 per order.)

Charge My: (\$10 minimum) American Express Visa MasterCard

Card No._____ Exp. Date._____

Mr/Mrs/Ms._____

print full name

Address._____

City/State/Zip._____

COMPUTER MAIL ORDER

THE CMO ADVANTAGE

- ✓ THE BEST PRICES! We will meet or beat any qualified price you find.
- ✓ Next day shipping on all in stock items.
- ✓ Free easy access order inquiry.
- ✓ Orders from outside Pennsylvania and Nevada save state sales tax.
- ✓ Free technical support with our factory trained technical staff.
- ✓ There is no limit and no deposit on C.O.D. orders.
- ✓ There's no extra charge for using your credit card. Your card is not charged until we ship.
- ✓ We accept purchase orders from qualified corporations. Subject to approval.
- ✓ Educational discounts available to qualified institutions.
- ✓ FREE CATALOG MEMBERSHIP.

ORDER LINE
1-800-233-8950
 In PA 1-800-242-4215

**CUSTOMER SERVICE
AND
TECH SUPPORT**
 1-717-327-1450

MAILING ADDRESS

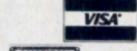
EAST
Dept. A305, 477 E. Third St.
 Williamsport, PA 17701

WEST
Dept. A305, P.O. Box 6689
 Stateline, NV 8944



MEMBER DIRECT MARKETING ASSOCIATION

CREDIT CARDS



SHIPPING

Add 3%, minimum \$5.00 shipping and handling on all orders. Larger shipments may require additional charges.

All items subject to availability and price change.

Returned shipments may be subject to a restocking fee.

CANADIAN ORDERS

1-800-268-3974
 Ontario/Quebec

1-800-268-4559
 Other Provinces

1-416-828-0866
 In Toronto

TELEX: 06-218960

2505 Dunwin Drive,
 Mississauga, Ontario
 Canada L5L1T1

All prices shown are for U.S.A. orders.
 Call The Canadian Office for Canadian prices.

HOME COMPUTERS

APPLE

APPLE Ile.....	CALL
APPLE IIc.....	CALL
MacINTOSH.....	CALL
IIC LCD Display.....	CALL



65XE (64K).....	CALL
130XE (128K).....	CALL
130ST (128K).....	CALL
520ST (512K).....	CALL

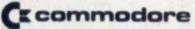
**NEW
CALL
FOR
PRICES**

600XL & 800XL CALL WHILE SUPPLIES LAST

850 Interface.....	\$109.00
1010 Recorder.....	\$49.99
1020 Color Printer.....	\$79.99
1025 Dot Matrix Printer.....	\$199.99
1027 Letter Quality Printer.....	\$269.99
1030 Direct Connect Modem.....	\$69.99
1050 Disk Drive.....	\$179.99
Touch Tablet.....	\$64.99
7097 Atari Logo.....	\$74.99
4018 Pilot (Home).....	\$57.99
5049 VisiCalc.....	\$59.99
CX30 Paddles.....	\$11.99
CX40 Joystick.....	\$7.99
4011 Star Raiders.....	\$12.99
4022 PacMan.....	\$16.99

BOARDS FOR ATARI

Axon 32K.....	\$39.99
Axon 48K.....	\$69.99
Axon 128K.....	\$269.99
Microbits 64K (600).....	\$109.00
Bit 3 Full View 80.....	\$239.00



NEW

Commodore 128, LCD..CALL

SX-64 Portable.....	\$499.00
Commodore Plus 4.....	\$199.00
CBM 64.....	\$149.00
C1541 Disk Drive.....	\$199.00
C1530 Datasette.....	\$39.99
M-801 Dot Matrix Printer.....	\$189.00
M-802 Dot Matrix/Serial.....	\$219.00
MCS 803 Dot Matrix.....	\$179.00
C1802 Color Monitor.....	\$199.00
C1660 Auto Modem.....	\$59.99
DPS 1101 Daisy Printer.....	\$339.00

Professional Software
 Fleet System II w/Spell.....\$59.99



File (64).....	\$59.99
Report (64).....	\$59.99

Precision Software

Superbase 64.....\$59.99

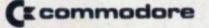
BATTERIES INCLUDED

PaperClip w/Spell Pack.....\$84.99

The Consultant DBMS.....\$69.99

Bus Card II.....\$149.00

80 Col Display.....\$149.00



CBM 8032.....\$639.00

CBM 4032.....\$599.00

2031 LP Disk Drive.....\$299.00

8050 Disk Drive.....\$999.00

8250 Disk Drive.....\$1249.00

4023 Printer.....\$329.00

8023 Printer.....\$589.00

6400 Printer.....CALL

Z-RAM.....\$299.00

Silicon Office.....\$299.00

Word Pro 4 Plus/5 Plus each...\$239.00

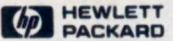
Info Pro.....\$179.00

Administrator.....\$399.00

Power.....\$69.99

CALL TOLL-FREE

PORTABLE COMPUTERS



41CV.....	\$189.99
41CX.....	\$249.99
HP 71B.....	\$419.99
HP 11C.....	\$62.99
HP 12C.....	\$89.99
HP 15C.....	\$89.99
HP 16C.....	\$89.99
HP 75D.....	\$999.99
HPII Module.....	\$98.99
HPII Cassette or Printer.....	\$359.99
Card Reader.....	\$143.99
Extended Function Module.....	\$63.99
Time Module.....	\$63.99

We stock the full line of
 HP calculator products

NEC

PC-8401.....	\$749.00
PC-8201 Portable Computer.....	\$299.00
PC-8231 Disk Drive.....	\$599.00
PC-8221A Thermal Printers.....	\$149.00
PC-8281A Data Recorder.....	\$99.99
PC-8201-06 8K RAM Chips.....	\$105.00

SHARP

PC-1350.....	\$159.99
PC-1261.....	\$159.99
PC-1260.....	\$109.99
PC-1500A.....	\$165.99
PC-1250A.....	\$88.99
CE-125 Printer/Cassette.....	\$128.99
CE-150 Color Printer Cassette.....	\$171.99
CE-161 16K RAM.....	\$134.99

DRIVES

HARD DRIVES



PC Store.....CALL

DISKETTES



5 to 45 meg (PC).....from \$1299.00

i-MEGA

10, 20 meg (PC).....from \$2149.00

Rana Systems

10 meg.....\$699.00

TALLGRASS TECHNOLOGIES

COMMITTED TO MEMORY

20, 30, 80 meg (PC).....from \$2699.00

FLOPPY DISK DRIVES

INDUS

Apple GT.....\$209.00

Atari GT.....\$249.00

C-64 GT.....\$259.00

μ-SCI

A1.5 Apple.....\$199.00

A2 Apple.....\$199.00

MSD

SD1 C-64 Single.....\$279.00

SD2 C-64 Dual.....\$479.00

Rana Systems

Rana 1000 (Atari).....\$199.00

Elite 1 (Apple).....\$189.00

Tandon

320K 5 1/4 "(PC).....\$139.00

MODEMS

ANCHOR

Volksmodem.....\$59.99

Volksmodem XII.....\$189.99

Mark IL Serial.....\$79.99

Mark VII (Auto Ans/Auto Dial).....\$99.99

Mark XII (1200 Baud).....\$259.00

Hayes

Smartmodem 300.....\$199.00

Smartmodem 1200.....\$389.00

Smartmodem 1200B.....\$359.00

Smartmodem 2400.....\$699.00

Micromodem Ile.....\$249.00

Micromodem 100.....\$149.00

Smart Com II.....\$89.99

Chronograph.....\$199.00

AST

Reach 1200 Baud Half Card.....\$399.00

MICROBITS

MPP-1000E AD/AA (Atari).....\$109.00

MPP-1064 AD/AA (C-64).....\$69.00

Novation

Smart Cat Plus.....\$329.00

J-Cat.....\$99.99

Smart Cat 103.....\$179.00

Smart Cat 103/212.....\$399.00

AutoCat.....\$219.00

212 AutoCat.....\$549.00

Apple Cat II.....\$249.00

212 Apple Cat.....\$449.00

Apple Cat 212 Upgrade.....\$259.00

Macmodem 1200B.....\$339.00

ZT

ZT-1.....\$339.00

ZT-10.....\$309.00

ZT-11.....\$369.00

maxell

5 1/4" MD-1.....\$18.99

5 1/4" MD-2.....\$28.99

8" FD-1.....\$39.99

8" FD-2.....\$49.99

Verbatim

5 1/4" SS/DD.....\$21.99

5 1/4" DS/DD.....\$29.99

Bib

5 1/4" Disk Head Cleaner.....\$14.99

Dennison

Elephant 5 1/4" SS/SD.....\$14.99

Elephant 5 1/4" SS/DD.....\$16.99

Elephant 5 1/4" DS/DD.....\$19.99

Elephant EMSP 5 1/4.....\$24.99

DISK HOLDERS

INNOVATIVE CONCEPTS

Flip-in-File 10.....\$3.99

Flip-in-File 50.....\$17.99

Flip-in-File 50 w/lock.....\$24.99

Flip-in-File (400/800 ROM).....\$17.99

AMARAY

50 Disk Tub.....\$9.99

GRAPHICS

Koala

Atari.....\$39.99

C-64.....\$59.99

IBM.....\$89.99

Apple/Franklin.....\$79.99

PERSONAL PERIPHERALS, INC.

Super Sketch Pad (C-64).....\$39.99

Super Sketch Pad (Atari).....\$39.99

Polaroid

Palette.....\$1399.00

COMPUTER MAIL ORDER

MONITORS

AMDEK

300 Green.....	\$129.00
300 Amber.....	\$149.00
300 Color/Audio.....	\$259.00
310 Amber IBM-Plug.....	\$169.00
Color 500 Composite/RGB.....	\$389.00
Color 600 Hi-Res (640x240).....	\$439.00
Color 700 Hi-Res (720x240).....	\$499.00
Color 710 Long Phosphor.....	\$579.00

BMC

9191U Color.....	\$199.00
12" Amber.....	\$69.99

NEC

JB 1260 Green.....	\$99.99
JB 1201 Green.....	\$139.00
JB 1205 Amber.....	\$139.00
JB 1215 Color.....	\$229.00
JC 1216 RGB.....	\$379.00
JC 1460 Color.....	\$269.00
JC 1410 RGB.....	\$669.00

PRINCETON

MAX-12 Amber.....	\$199.00
HX-12 RGB.....	\$489.00
SR-12 RGB.....	\$629.00

Sakata

SC-100 Color.....	\$249.00
SG-1000 Green.....	\$129.00
SA-1000 Amber.....	\$139.00

TAXAN

115 12" Green Mono.....	\$99.99
116 12" Amber Mono.....	\$99.99
121 Green TTL.....	\$149.00
122 Amber TTL.....	\$159.00
210 Color RGB.....	\$239.00
400 Med-Res RGB.....	\$319.00
415 Hi-Res RGB.....	\$439.00
420 Hi-Res RGB (IBM).....	\$429.00
440 Ultra Hi-Res RGB.....	\$649.00

QUADRAM

8400 Quadchrome.....	\$489.00
8410 Quadchrome II.....	\$479.00
8420 Amberchrome.....	\$199.00

ZUMM

ZVM 122 Amber.....	\$89.99
ZVM 123 Green.....	\$89.99
ZVM 124 IBM Amber.....	\$149.00
ZVM 131 Color.....	\$299.00
ZVM 133 RGB.....	\$429.00
ZVM 135 RGB/Color.....	\$459.00
ZVM 136 RGB/Color.....	\$629.00

INTERFACES

PRACTICAL

Graphcard.....	\$79.99
Serial Card.....	\$99.99
Microbuffer II +.....	\$169.00
Microbuffer 32K.....	\$189.00

QUADRAM

Microfazer.....	from \$139.00
Efazer (Epson).....	\$79.99

Orange Micro

Graffier CD (C64).....	\$99.99
Graffier + (Apple).....	\$109.00
Graffier 16K + (Apple).....	\$189.00

DIGITAL DEVICES

Ape Face (Atari).....	\$49.99
Uprint (Atari).....	\$59.99
Uprint (C-64).....	\$59.99
Printer Buffer P-16.....	\$79.99

MICROBITS

MB1150 Parallel (Atari).....	\$79.99
MPP-1150 Parallel (Atari).....	\$69.99
MP-1150XL (Atari 1200XL).....	\$69.99
MicroStuffer 64K Print Buffer.....	\$109.00

PRINTERS

AXIOM

AT-100 Atari Interface Printer.....	\$159.00
AT-550 Atari Dual Mode.....	\$259.00
GP-100 Parallel Interface.....	\$189.00
GP-700 Atari Color Printer.....	\$489.00
GP-550 Parallel Printer.....	\$269.00

BMC

401 Letter Quality.....	\$589.00
BX-80 Dot Matrix.....	\$229.00
CITIZEN	
MSP-10 (80 col).....	\$349.00
MSP-15 (132 col).....	\$539.00

C. ITOH

Prowriter 7500.....	\$219.00
Prowriter 8510P.....	\$299.00
Prowriter 1550P.....	\$469.00
Son of Starwriter A10P.....	\$459.00
Hot Dot Matrix.....	\$459.00
F10-40P Starwriter.....	\$899.00
F10-55 Printmaster.....	\$1049.00

COMREX

ComWriterII Letter Quality.....	\$399.00
DIABLO	
620 Letter Quality.....	\$749.00

630 API Letter Quality.....	\$1549.00
EPSON	

RX-80, RX-100, LX-80.....	CALL
FX-80 +, FX-100 +.....	CALL
LQ 1500, JX80 Color.....	CALL
Homewriter 10.....	CALL

JUKT

6100.....	\$439.00
6300.....	\$749.00

MANNESMANN TALLY

Spirit 80.....	\$239.00
160L.....	\$569.00
180L.....	\$699.00

NEC

8027 Transportable.....	\$319.00
2010/15/30/.....	\$699.00
3510/15/30.....	\$1299.00
3550 IBM.....	\$1399.00
8810/15/30.....	\$1699.00
8850 IBM.....	\$1749.00

OKIDATA

82, 83, 84, 92, 93, 180, 2350, 2410, Okimate-20.....	CALL
Okimate-64.....	\$199.00

OLYMPIA

Needlepoint Dot Matrix.....	\$339.00
Compact RO.....	\$399.00
Compact 2.....	\$439.00

Panasonic

KX1090.....	\$199.00
KX1091.....	\$279.00
KX1092.....	\$439.00
KX1093.....	\$619.00

QUADRAM

Quadjet.....	\$749.00
--------------	----------

SILVER-REED

400 Letter Quality.....	\$279.00
500 Letter Quality.....	\$329.00
550 Letter Quality.....	\$459.00
770 Letter Quality.....	\$799.00

STAR

SG10 (120 cps).....	\$239.00
SG15 (120 cps).....	\$399.00
SD10 (160 cps).....	\$369.00
SD15 (160 cps).....	\$479.00
SR10 (200 cps).....	\$499.00
SR15 (200 cps).....	\$649.00
PowerType.....	\$329.00

TOSHIBA

1340.....	\$599.00
1351.....	\$1299.00

PC COMPATIBLES

ZENITH

PC-150 Desktop..... CALL

PC-160 Portable..... CALL

COLUMBIA

Desktops..... CALL

Portables..... CALL

SANYO

MBC 550-2 Single Drive..... \$749.00

MBC 555-2 Dual Drive..... \$1099.00

MBC 775 Portable..... CALL

AT&T

Safari..... CALL

6300..... CALL

CORONA

Desktops..... CALL

Portables..... CALL

NEC

NEC PC-8800 8/16 Bit..... CALL

IBM



IBM PC SYSTEMS

Configured to your

specifications.

Call for Best Price!

256K, 1-DS/DD DRIVE KEYBOARD

MULTIFUNCTION CARDS

AMDEK

MAI..... \$249.00

AST

Six Pack Plus..... \$239.00

Mega Plus II..... \$269.00

I/O Plus II..... \$139.00

Memory MBII..... \$249.00

Advantage-AT..... \$399.00

Preview Monograph..... \$299.00

Graph Pak Mono/64K..... \$599.00

MonoGraph Plus..... \$399.00

DCA

IRMA 3270..... \$899.00

important part is the setup program. You will know you need to run SETUP, because when the AT boots, it complains if its configuration memory is empty. The SETUP program is simple to use and speaks English for the most part. You will need to collect some information (amount of memory installed, type of hard disk) but IBM has provided a checklist for recording these items; if you use the checklist when you are performing the installation, you will have everything you need for SETUP. A nice feature of the AT is its built-in clock/calendar, and SETUP is the vehicle for getting proper values of the time and date initialized.

After SETUP, every boot of the system will read the time, date, and configuration memory. The AT maintains compatibility with its other family members by storing the configuration in absolute memory location 0040:0010 (aka 410), so application programs should feel at home.

Now that your AT is ready to run, all that is left is to install DOS—version 3.0 (or later) required. I'm making the assumption that most ATs will have a fixed disk, so the process is to boot DOS from diskette, run FDISK, run FORMAT /S, and then add files to your disk as desired. Table 1 shows how I typically organize my directory structure, and Figure 1 is a listing of the AUTOEXEC.BAT file I use to get going.

EGA Confusion

My confusion with the Enhanced Graphics Adapter was enhanced by the mound of documentation that came with it. In a way, it is funny. Installation of the AT is really the simplest of any PC family member yet, but it is the most well supported with documents. Better some of the effort should have been spent on the EGA. In particular, one of those charts would have been very helpful. The chart could give the big picture by acting as a roadmap and explaining what each of the individual documents was for.

At the moment, each one says things like "I am package 4. If you haven't opened Package 1, do so first." Yeah, but why? What's it for? Worse, you need to use some packages if you have an AT and others if you have a PC or XT. It is just not clear enough, at least not for me.

IBM's overall documentation strategy is good, as far as I am concerned. However, it is incumbent on us, as users, to maintain the books over time. The

EGA includes updates for the Guide to Operations, for example. Because there are different Guides for different PC models, I had some difficulty deciding what went where. Again, I wished for the roadmap.

Once inside the EGA documents, the installation went smoothly. It was more complicated than usual because the EGA can be equipped with piggy-back memory options and must be jumpered depending on the display to be used (EGA supports IBM Monochrome, Color, and Enhanced Color displays). In addition, a set of DIP-like switches, accessible from the outside, must be set; for the first time in my IBM memory, the on and off positions of a switch are not clearly marked.

One thing that caught me was a protector that IBM installs on the piggy-back pin connector of the EGA. Even though IBM includes a note about removing it, the protector looks like a female pin connector and is somewhat confusing. I would have gotten over this hump more quickly if the protector had been bright red instead of black, and IBM's note would have been clearer.

Hard Disk Fever

A couple of issues ago I talked about how I used my home system with electronic disk and how that strategy satisfied me even though I used an XT at work. I'm sorry to report that having an AT on my work desk has destroyed the harmony of my venerable PC.

Generally speaking, my RAM disk gave me performance similar to that of the XT. It did take some discipline on my part, but practice makes perfect. The AT, however, is a whole lot peppier than

the XT. My personal PC seemed pretty pathetic by comparison. I became vulnerable. I weakened. I began to look at ads for hard disks. I began to consider the options. And then, it happened. Kamerman Labs lowered their price by \$200, to \$695, and I burned up the telephone lines getting my order to them.

The going price right now for ten megabytes of internal hard disk is \$695, or less. Just about every mail order house has an offer in that price range. I'm satisfied with my purchase, and I thought I should tell you the basis upon which it was made and some of the other pertinent details.

To begin with, Kamerman is not the only choice. You should make your decision based on price and the reputation of the vendor. Also, look to see if the vendor you choose has other products. Some of the sellers of hard disk systems are in business right now only to take advantage of the price situation; next year, they might be selling pet rocks or hula hoops. A vendor with multiple products in the category (different sizes of hard disk, tape backup, external mount subsystems, etc.) is more likely to have a broader customer base and is thus more likely to be around when you need service. Ignore this advice if the price for the entire subsystem drops below \$500: for that kind of money, you can afford to buy a new unit when the old one fails.

You should also carefully consider the power situation. A standard PC delivers 65 watts, enough to power the hard disk if the system is not overpopulated with boards. If you have a full house, however, you should seriously consider additional power. I decided to buy an IBM XT power supply as a spare

Figure 1. AUTOEXEC.BAT.

```
echo off
path c:\;c:\wp;c:\util;c:\dos;c:\comm
cd \util\sidekick
sk
cd \
cls
ver
tm
echo -----
chkdsk
echo -----
prompt [$p]$g
set
echo on
```

TM is a Peter Norton utility that displays the date and time in a pleasing format. CHKDOSK is included so that on every startup, the state of the hard disk can be seen. SET is used to verify the state of environment settings, like PATH.

part from my dealer. I paid a premium (\$215 vs. \$79 up from third parties), but I was willing to do so because I carry an IBM service contract on my system unit (the only part so covered) and wanted to keep the system as IBM as possible. Replacing the PC power supply with either IBM's XT unit or other replacement is easy.

Installing the Kamerman Megafight was a little tedious but not complicated. It arrived with a half-height bezel mounted and a full-height bezel in the box. I needed the latter, and had to exchange them. That also required the addition of "legs" on the drive to get it to the proper mounting height; Kamerman supplies long bolts for this purpose. The cabling instructions are clear, and I had no trouble of note.

Kamerman's software for the installation process is quite good. Getting from a factory disk to an installed system was automatic, with the Kamerman program supervising the execution of the DOS programs FDISK and FORMAT. The system is ready to boot from the hard disk after this program runs.

A warning: before you take your system apart and remove disk drive B:, make copies of the Kamerman software as the manual suggests. I forgot, and it is a much slower process with only one floppy. Also, don't forget to set the system board switches to reflect one floppy so that DOS will behave properly if drive B: is ever mentioned again.

Most of the vendors of disk subsystems are using the same set of suppliers for the disk drive itself. This means that you can generally depend on the physical drive. The electronics are also moving in a common direction, with the controller chips coming from a small subset of manufacturers. I'd suggest only that you look for a one-year warranty on the whole subsystem and a return policy if, for any reason, you are unhappy with your purchase.

I did have to sacrifice something when the hard disk went in. I gave up my game port. I find myself wishing for an AST MegaPlus II instead of my original, gameportless MegaPlus, but maybe I'll solve the problem by buying an EGA to replace both my Monochrome and

Color adapters; I'll pick up a slot in the process.

By the way, I had already upgraded my system with the new IBM ROM BIOS chip. If you have a PC whose serial number is smaller than 030060, you need the new chip if you want the system to boot from the hard disk. Every machine purchased after about April, 1983, has the new BIOS. Your dealer can help if you are uncertain.

Oh yeah, the end of the story. That XT power supply is noisy. Aurally, it can be heard across the basement; the original PC supply was much quieter. Electronically, it messes up the TV in my kitchen worse than the PC did; the PC garbled distant stations while the XT supply affects local stations on the low end of the VHF band.

Ah, progress. ■

Firm Mentioned In This Column

Kamerman Labs
7787 S.W. Cirrus Dr.
Beaverton, OR 97005
(503) 626-6877

Professional Handicapping Systems



by Professor Jones

GLD. Thoroughbred "Gold" Edition™

A "Full" featured thoroughbred analysis designed for the professional and serious novice. \$159.95 complete.

EGLD. Enhanced "Gold" Edition™

"Gold" Edition with complete Master Bettor™ system integrated onto the same disk. This powerful program will transfer all horses and scores to the bet analysis with a "single keystroke." (Master Bettor™ included) \$199.95 complete

GLTD. Limited "Gold"™

Enables Professional Handicappers to assign specific values to the racing variables "they" feel are important. Create program weight based on a particular track and fine tune it for maximum win percentage. This program is designed for "ease of use". The user needs no programming experience. (contains Integrated Bettor™) \$299.95 complete

GD. Gold Dog Analysis™

The only professional dog handicapper on the market, includes:
1) Speed 4) Post Last 7) Running Style
2) Post Today 5) Distance 8) Weight
3) Kennel 6) Condition 9) All new internal weighting
10) NEW class indicator

If you are near a greyhound track, you can't afford not to use this program. \$149.95 complete (with integrated Master Bettor™) \$199.95 Limited Dog™ \$299.95

PPX. Professor Jones' Football Predictor, Prof. Pix™

Complete Football Analysis with Data-Base.
1) Overlays 3) "Super Plays" 5) Data Base Stats
2) Point Spreads 4) "Over/Under" bets 6) Holds 100 teams
Highest percentage of winners 94% \$99.95 with Data Base Management

MHH. Master Harness Handicapper™

Professional software designed to provide a thorough analysis of all trotter and pacer races in North America and Canada.

\$159.95 complete with integrated Master Bettor™ \$199.95

NBA. Basketball™

This data base managed analysis will provide the user with "ALL" betting situations while storing relevant information on the disk.

\$79.95 complete with Manual

LOT. Lottery Analysis™

Statistical comparison program designed to detect subtle patterns in winning lottery numbers.

\$49.95 complete with Manual

BROCHURE AVAILABLE

CIRCLE 120 ON READER SERVICE CARD

IBM™
APPLE™
TRS-80™
CPM™
COMMODORE™

Prof. Jones

1114 N. 24th St.
Boise, ID 83702



48 HR. FREE
SHIPPING

CALL
208-342-6939

TERMS: FREE SHIPPING
ALL SOFTWARE. Add
\$6.00 UPS. Blue/C.O.D.
Add \$6.00/3 weeks
personal checks/ Add
4.5% ID residents/Add
\$6.00 outside U.S.A./
Prices subject to change

GOOD STUFF!

IBM PC & Compatables
IBM-PC Junior

Sanyo 550 - Tandy MSDOS
⇒**GREAT PROGRAMS**←
★**SUPER LOW PRICES**★
SUPER SAMPLER \$5 PPD
SS1-SS12 DISKS \$8.95 PPD

Looking for good low-cost programs for your PC computer, as well as good, solid information? You've found it!

Business, Financial, Games galore, Educational, Utilities and Graphics. They are all here! There are presently 12 disks and each has 7 to 12 programs. They are all listable and unprotected. Don't take our word for it! Send \$5 for our Super Sampler diskette with 10 great programs, including a super loan amortization program, graphic blackjack, a full adventure and more! Full info on our other products and our information-packed newsletter will be included with your order!

SUPER MAILING LIST 14.95 Postpaid

Add, change, delete names, addresses and phone numbers with 8 category flags to select on. Prints lists or labels. Sort on zip or names. A random access tutorial in itself. A SUPER VALUE!

COMPUTER SOLUTIONS
P.O. BOX 354
• MASON, MICHIGAN 48854
(517) 628-2943

Phone Orders Welcome - Quick Service



CIRCLE 138 ON READER SERVICE CARD

TANDY GRAM

An enhanced keyboard and screen mode
for Color Computers

Jake Commander

First I'd like to say a big "thanks" to those of you who have taken the time to write to me with your ideas regarding this column. Forgive me for not being able to personally reply to all of you; there are simply too many letters to answer. Nevertheless, any that are of general interest, I'll address in this column. Your suggestions range from programs to reviews to more specific interests. In other words everyone would like to see everything. Ah well, nobody said it would be easy, and I'm happy to note that TRS-80 users are as enthusiastic as ever about their machines.

This month I'm devoting the column to a 6809 machine-code program for the Color Computer which I've entitled Chroma-Key. It is a utility that allows you to use the keyboard and screen in an enhanced mode something like (dare I say it?) the Commodore 64. Model I/III/4 users needn't feel left out though; a similar program for Z-80 people will follow in this column next month if space permits. This program is on the large side so it is split in two—half this month and half next. (Remember, too, the CompuServe subscribers can download the program from *Creative Computing Online* (PCS-22).) When you have the whole thing typed in and assembled, the following functions are available:

- Repeating keys with lowercase on Shift.
- Twenty-seven predefined keys. Shifted A to Z and Shift/right-arrow are all defined as various Basic commands.
- Redefinition of keys so that a single keystroke can enter a whole word or sequence of words. The whole definition table can be saved to or loaded from tape.
- A screen editor which allows entry and editing of characters on the video display. A special graphics sub-feature allows easy entry of low resolution graphic characters.

When the output feature is invoked, the keyboard definitions are saved on tape as a file named KEYDEF. I'm afraid I never did find time to add the disk save feature, so if anybody wants to

volunteer, I'll be happy to include it in a future column. The list of predefined keys will appear next month after the end of the listing.

For those of you who have never tried your hand with EDTASM+ on the Color Computer, now is your chance. I should point out that this listing appears as output from the assembler during the assembly process. The first three columns printed by the assembler simply show addresses in memory followed by the bytes that are to be loaded there. As data-entry operator, you need to type in only the information that appears after each line number. If you are crazy enough, you can use the first three columns to key in the machine code in hexadecimal. (Does anybody still do that these days?) However, the more sane among you will fire up to EDTASM+—

or whichever is your favorite editor-assembler—and start off by entering I10.

The line numbers in the listing are stepped in tens from 10 to 4820, so you have only 482 lines to enter without making a mistake. Dead easy. Now you see why this is in two parts.

Note that the version listed is for a 32K machine. To get the program working on a 16K machine, you will have to alter line 130 from 7C00 to 3C00; it's that simple. The comments in the listing serve to illustrate how the program works. I don't intend to go into further detail on that score, unless there is a demand for it, as this project already seems to be occupying the greater part of two columns.

Next month you'll have the second half of the listing along with the instructions to enable you to use the utility. ■

Color TRS-80 Chroma-Key listing.

```
00010 ****
00020 * COLOR TRS-80 Chroma-Key
00030 * Copyright 1985 Jake Commander
00040 ****
0028 00050 LONG EQU 40
0004 00060 SHORT EQU 4
0027 00070 MSIZE EQU $27
0088 00080 CURS EQU $88
008A 00090 ZERO EQU $8A
005D 00100 SEDT EQU $5D
005F 00110 ENDM EQU $5F
00 00120 SETDP 0
7C00 00130 ORG $7C00 ;3C00=16K
7C00 00 00140 FCB 0 ;TABLE END
7C01 00 00150 FCB 0
7C02 2C 00160 FCC /,2-#TNIRPz/
32 2D 23 54
4E 49 52 50
7A
7C0C 00 00170 FCB 0
7C0D 28 00180 FCC /INELY/
4E 45 4C 79
7C12 00 00190 FCB 0
7C13 28 00200 FCC /ISRTSx/
24 52 54 53
78
7C19 00 00210 FCB 0
7C1A 28 00220 FCC /IDNRw/
44 4E 52 77
7C1F 00 00230 FCB 0
7C20 28 00240 FCC /ILAVv/
4C 41 56 76
7C25 00 00250 FCB 0
7C26 47 00260 FCC /GNISUu/
4E 49 53 55
75
```

Software That Works For Generations

**6 Types of Charts and Sheets
Indices
User Fields
Notes, Footnotes and Sources
No Limits
Adapts to Your Hardware
Comprehensive
Easy to Use
And Much, Much More**

Send for brochure and sample printouts.
Family Roots includes detailed manual and 2 full diskettes
 of programs for your Apple II, IBM PC,
 Commodore 64 and CP/M.*
 Other genealogy software also available.
 Price \$185. Satisfaction Guaranteed.
 American Express, Visa & Mastercard Accepted

* Trademarks for
 Apple Computer,
 Inc., International

Business Machines,
 CBM, Inc., & Digital
 Research.



Family Roots

QUINSEPT, INC.
P.O. Box 216, Lexington, MA 02173
(617) 862-0404

CIRCLE 149 ON READER SERVICE CARD

7C2C	00	00270	FCB	0
7C2D	4E	00280	FCC	/NEHTt/
	45 48 54 74			
7C32	00	00290	FCB	0
7C33	24	00300	FCC	/\$GNIRTSs/
	47 4E 49 52			
	54 53 73			
7C3B	00	00310	FCB	0
7C3C	4E	00320	FCC	/NRUTERx/
	52 55 54 45			
	52 72			
7C43	00	00330	FCB	0
7C44	24	00340	FCC	/\$YEKNIq/
	59 45 4B 4E			
	49 71			
7C4B	00	00350	FCB	0
7C4C	28	00360	FCC	/ITNIOPp/
	54 4E 49 4F			
	50 70			
7C53	00	00370	FCB	0
7C54	28	00380	FCC	/ICSAo/
	43 53 41 6F			
7C59	00	00390	FCB	0
7C5A	54	00400	FCC	/TXENn/
	58 45 4E 6E			
7C5F	00	00410	FCB	0
7C60	28	00420	FCC	/\$DIMm/
	24 44 49 4D			
	60			
7C66	00	00430	FCB	0
7C67	44	00440	FCC	/DAOLC1/
	41 4F 4C 43			
	6C			
7C6D	00	00450	FCB	0
7C6E	22	00460	FCC	/"EVASCK/
	45 56 41 53			
	43 6B			
7C75	00	00470	FCB	0
7C76	28	00480	FCC	/IKTSYOJ/
	48 54 53 59			
	4F 4A 6A			
7C7E	00	00490	FCB	0
7C7F	54	00500	FCC	/TUPNII/
	55 50 4E 49			
	69			
7C85	00	00510	FCB	0
7C86	24	00520	FCC	/\$THGIRh/
	54 48 47 49			
	52 68			
7C8D	00	00530	FCB	0
7C8E	4F	00540	FCC	/OTOGa/
	54 4F 47 67			
7C93	00	00550	FCB	0
7C94	24	00560	FCC	/\$TFELf/
	54 46 45 4C			
	66			
7C9A	00	00570	FCB	0
7C9B	45	00580	FCC	/ESLEe/
	53 4C 45 65			
7CA0	00	00590	FCB	0
7CA1	41	00600	FCC	/ATADD/
	54 41 44 64			
7CA6	00	00610	FCB	0
7CA7	28	00620	FCC	/\$RHCC/
	24 52 48 43			
	63			
7CAD	00	00630	FCB	0
7CAE	28	00640	FCC	/ITNIb/
	54 4E 49 62			
7CB3	00	00650	FCB	0
7CB4	42	00660	FCC	/BUSOGa/
	55 53 4F 47			
	61			
7CBA	00	00670	FCB	0
7CBB	28	00680	FCC	/IBAT/
	42 41 54 5D			
7CC0	00	00690	KTBL	
	00700 *			
7CC1 B6	016A	00710	INIT	LDA \$016A
7CC4 A7	BC 1C	00720	STA	<SVCT1,PCR ,SAVE..
7CC7 FC	016B	00730	LDI	\$016B

IBM & Apple & Commodore

GAMES

Professional Football
 Wizard Immortal
 The Third World War
 The Presidential Election
 World Series Baseball
 The Martian Invasion
 Championship Horse Racing
 Wall Street

\$16 each
 \$32 for 3 Games.... Save 33%
 \$48 for 5 Games.... Save 40%
 \$64 for all 8..... Save 50%

APPLICATIONS

Budget Analysis and Projection
 Checkbook and Account Manager
 Pie Chart Generator and Filer
 Bar Graph / Trend Tracking
 Appointments and Schedule Assistant
 Calculator and Typewriter Simulator
 Interest Calc / Monthly Payments
 Calendar Generator / Biorythrum

\$16 each
 \$32 for 3 Programs.... Save 33%
 \$48 for 5 Programs.... Save 40%
 \$64 for all 8..... Save 50%

SPECTRE SOFTWARE

Terms of Sale: Send Cashier's Check, Money Order or Personal Check to SPECTRE Software, Box #9, P.O. Box 1000, Delray Beach, FL 33445. Add \$3.00 for postage. Florida Residents: Add 5% Sales Tax. CDS Orders: Add \$3.00 Postage. Specials: Computer - IBM PC, PCjr, Apple II, II+4, III, IV or Commodore 64, 64+ and VIC-20. Disk or Source Code - \$10.00 for 5.25" Disk, \$12.00 for 3.5" Disk. Books - \$10.00 for Softcover, \$12.00 for Hardback. Books for Personal Checks Only. Send for Catalog. Dealer Inquiries: Minimum \$100 Sale. Please Allow 4 Weeks for Personal Checks to Clear.

DISKETTES

Introducing...

FLOPPY
DISKS
WITH A
BONUS
IN EVERY
BOX!



WOW!
11 DISKS FOR THE PRICE OF 10!

1 FREE DISK IN
EACH BOX!

SS/DD 91¢ (\$9.10 PER BOX)
DS/DD \$1.17 (\$11.70 PER BOX)
2 BOX MINIMUM

CALL TOLL FREE 1-800-524-8130
IL. CALL COLLECT 312-455-4488

Disk Jockey
P.O. BOX 35146
CHICAGO IL • 60635-0146
MASTERCARD VISA C.O.D.

CIRCLE 109 ON READER SERVICE CARD

Put Professional Knowledge and a
COLLEGE DEGREE

in your Electronics Career through

**HOME
STUDY**



**Earn Your
DEGREE**

No commuting to class. Study at your own pace, while you continue your present job. Learn from Grantham easy-to-understand lessons, with help from your home-study instructors.

You can earn your B. S. Degree in the Grantham electronics degree program, offered by independent home study and accredited by the NHSC Accrediting Commission.

Our free bulletin gives details. Write for Bulletin C-85

**Grantham College of Engineering
10570 Humbolt Street**

Los Alamitos, California 90720

CIRCLE 140 ON READER SERVICE CARD

TANDY GRAM

Color TRS-80 Chroma-Key listing. (continued)

7CCA ED	8C 17	00740	STD	SVCT2 ,PCR	; . . . VECTOR	
7CCD 86	7E	00750	LDA	#\$7E	; "JMP"	
7CCF B7	016A	00760	STA	\$016A	; NEW VECTOR-	
7CD2 30	8C 06	00770	LEAX	<CHRIN ,PCR		
7CD5 BF	016B	00780	STX	\$016B	; - INTO PLACE	
7CD8 7E	AC73	00790	JMP	\$AC73	; TO "OK"	
		00800 *				
7CDB 0F	70	00810	CHRIN	CLR	<\$70	; IOBUF UNFLUSHED
7CDD 0D	6F	00820		TST	<\$6F	; KBD I/P RQSTD?
7CDF 1027	0102	00830		LBEQ	PLRET	; YES
7CE3 7E	0000	00840	SVCT1	JMP	>*-*	
		00850	SVCT2	EQU	*-2	
		00860 *				
		00870 *****				
		00880 *				
		00890 *				
7CE6	2C	00900	FPRS	FCC / . /		
7CE7	AC	00910		FCB	\$AC	
7CE8	31	00920		FCC	/1 , "KEYDEF /	
	2C 22 4B	45				
	59 44 45	46				
7CF1	00	00930		FCB	0	
		00940 *				
7CF2 8D	61	00950	OPTF	BSR	KBD	; GET I OR O
7CF4 6F	8D 0142	00960		CLR	DEFINE ,PCR	; DEF OFF
7CF8 1F	89	00970		TFR	A,B	
7CFA C4	DF	00980		ANDB	#\$DF	; TO UPRCASE
7CFC 30	8C E7	00990		LEAX	FPRS ,PCR	; => PARAS
7CFF 9F	A6	01000		STX	<\$A6	; TO PARSER
7D01 BD	A5FF	01010		JSR	\$A5FF	; OPEN FILE
7D04 86	FF	01020		LDA	#-1	; RESET..
7D06 97	6F	01030		STA	<\$6F	; .. DEVNUM
7D08 31	8C B5	01040		LEAY	KTBL ,PCR	; => KEYDEFS
7D0B 96	78	01050		LDA	<\$78	; FILE I/O MODE
7D0D 4A		01060		DECA		; INPUT?
7D0E 27	15	01070		BEQ	INP	; IF SO
		01080 *				
7D10 A6	A2	01090	A1	LDA	, -Y	; CHR FROM TBL
7D12 34	01	01100	B1	PSHS	CC	; SAVE ZF
7D14 BD	A282	01110		JSR	\$A282	; O/P BYTE
7D17 35	01	01120		PULS	CC	; ZERO?
7D19 26	F5	01130		BNE	A1	; NO
7D1B A6	A2	01140		LDA	, -Y	; NXT TBL BYTE
7D1D 26	F3	01150		BNE	B1	; MORE IN TBL
7D1F BD	A282	01160		JSR	\$A282	; O/P LAST ZERO
7D22 7E	A426	01170	CLOSE	JMP	\$A426	; ROM CLOSE RTNE
		01180 *				
7D25 8D	0B	01190	INP	BSR	A2	; GET/STORE CHR
7D27 26	FC	01200		BNE	INP	; NOT END DEFN
7D29 8D	07	01210		BSR	A2	; GET/STORE CHR
7D2B 26	F8	01220		BNE	INP	; IF NOT END TBL
7D2D 8D	F3	01230		BSR	CLOSE	; CLOSE FILE
7D2F 7E	B958	01240		JMP	\$B958	; PRINT C/R
7D32 109C	27	01250	A2	CMPY	MSIZE	; ROOM IN TBL ?
7D35 22	05	01260		BHI	B2	; IF SO
7D37 8D	E9	01270		BSR	CLOSE	; ELSE CLOSE I/P
7D39 16	0191	01280		LBRA	OM	; OM ERR
7D3C BD	A176	01290	B2	JSR	\$A176	; GET I/P CHR
7D3F A7	A2	01300		STA	, -Y	; INTO TBL
7D41 39		01310		RTS		
		01320 *				
		01330 *****				
		01340 *				
7D42 AE	8D 0095	01350	RPKB	LDX	AUTO ,PCR	; AUTO MODE?
7D46 27	0D	01360		BEQ	KBD	; NO-GET KBD CHR
7D48 A6	82	01370		LDA	, -X	; USE AUTO CHR
7D4A 26	02	01380		BNE	A3	; IF NOT DEFN END
7D4C 9E	8A	01390		LDX	<ZERO	; AUTO OFF
7D4E AF	8D 0089	01400	A3	STX	AUTO ,PCR	; UPDATE PNTR
7D52 27	01	01410		BEQ	KBD	; IF AUTO END
7D54 39		01420		RTS		
		01430 *				
7D55 8E	0028	01440	KBD	LDX	#LONG	; CRNT DELAY
7D58 34	10	01450	G4	PSHS	X	
7D5A 8D	4C	01460		BSR	FLASH	; DO CRSR FLASH
7D5C BD	A1C1	01470		JSR	\$A1C1	; SCAN KBD
7D5F 35	10	01480		PULS	X	
7D61 26	18	01490		BNE	I4	; IF GOT CHR
7D63 30	1F	01500		LEAX	-1 , X	; COUNTDOWN

don't shop in the dark

for apple products!

7D65 26	F1	01510	BNE	G4	, SCAN TIL 0
7D67 C6	FF	01520	LDB	#\$FF	, ELSE CLR ROLOVRS
7D69 86	08	01530	LDA	#8	, TO ALLOW RPT
7D6B 8E	0152	01540	LDX	##152	, ZAP BITS
7D6E E7	80	01550 H4	STB	, X+	, DONE ALL?
7D70 4A		01560	DECA		, IF NOT
7D71 26	FB	01570	BNE	H4	, IN CASE RPT
7D73 8E	0004	01580	LDX	#SHORT	, RPT CHR THERE?
7D76 BD	A1C1	01590	JSR	\$A1C1	, YES, KEEP SHORT
7D79 26	03	01600	BNE	J4	, RDY 1ST RPT
7D7B 8E	0028	01610 I4	LDX	#LONG	, STOW IT
7D7E AF	8C D5	01620 J4	STX	<KBD+1,PCR	, GOT CHR?
7D81 4D		01630	TSTA		, NO KEEP GOING
7D82 27	D4	01640	BEQ	G4	
		01650 *			
7D84 7D	011A	01660	TST	\$011A	, IN LWRCASE?
7D87 27	13	01670	BEQ	A5	, YES-RTS
7D89 81	41	01680	CMPA	'A	, CHR A - Z?
7D8B 25	0F	01690	BLO	A5	, NO
7D8D 81	5A	01700	CMPA	'Z	, CHR > Z?
7D8F 22	0B	01710	BHI	A5	, YES, USE AS IS
7D91 34	02	01720	PSHS	A	, SAVE CHR
7D93 BD	7D9D	01730	JSR	SHKEY	, SHIFTED?
7D96 35	02	01740	PULS	A	, RSTR I/P CHR
7D98 26	02	01750	BNE	A5	, NO SHIFT
7D9A 88	20	01760	EORA	##20	, RVRSE CASE
7D9C 39		01770 A5	RTS		
		01780 *			
7D9D 86	7F	01790 SHKEY	LDA	##7F	, MASK FOR SHIFT
7D9F B7	FF02	01800	STA	##FF02	
7DA2 B6	FF00	01810	LDA	##FF00	, CHECK KBD ROW
7DA5 84	40	01820	ANDA	##40	, EXTRACT SHIFT
7DA7 39		01830	RTS		
		01840 *			
7DAB 109E	88	01850 FLASH	LDY	<CURS	
7DAB E6	A4	01860	LDB	, Y	, CHR AT CRSR
7DAD 86	8C	01870	LDA	##8C	, "DEFINE" CRSR
7DAF 6D	8D 0087	01880	TST	DEFINE,PCR	, DEFINING?
7DB3 26	1A	01890	BNE	Q6	, USE DEFINE CRSR
7DB5 6D	8C 22	01900	TST	<SESW,PCR	, SCRN EDIT?
7DB8 26	03	01910	BNE	SCSR	, YES
7DBA 7E	A199	01920	JMP	\$A199	, NORMAL FLASH
7DBD 8D	09	01930 SCSR	BSR	P6	, FLASH CRSR CHR
7DBF 109E	5F	01940	LDY	<ENDM	, =ENDM OR ZERO
7DC2 E6	A4	01950	LDB	, Y	, ENDM CRSR CHR
7DC4 03	05	01960	COM	<\$5	, EVERY OTHR TIME
7DC6 28	09	01970	BMI	R6	, FLASH IF NEG
7DC8 86	2B	01980 P6	LDA	##2B	, WHITE CROSS
7DCA 5D		01990	TSTB		, GRAPHIC CHR?
7DCB 2B	02	02000	BMI	Q6	, YES
7DDC 86	80	02010	LDA	##80	, ELSE USE BLACK
7DCF A7	A4	02020 Q6	STA	, Y	, TO VIDEO
7DD1 8E	017A	02030 R6	LDX	##17A	, DELAY COUNTER
7DD4 BD	A7D3	02040	JSR	\$A7D3	, DO DELAY
7DD7 E7	A4	02050	STB	, Y	, REPLACE CHR
7DD9 39		02060	RTS		
		02070 *			
7DDA SWITCH	00	02080 SESW	FCB	0	, SCREEN EDIT
7DDB	0000	02090 AUTO	FDB	0	, DEF'D CHR PTR
		02100 *			
		02110 *****			
		02120 *			
7DDD E6	8C 5A	02130 CHDA	LDB	<DEFINE,PCR	
7DE0 EA	8D FFF7	02140	ORB	AUTO,PCR	, NZ IF EITHER
7DE4 39		02150	RTS		
		02160 *			
7DE5 32	62	02170 PLRET	LEAS	2,S	, PULL RET
7DE7 34	74	02180 KBIN	PSHS	B,X,Y,U	
7DE9 17	FF56	02190 KCHR	LBSR	RPKB	, GET KBD CHR
7DEC 30	8C FA	02200	LEAX	KCHR,PCR	, RETURN ADR
7DEF 34	10	02210	PSHS	X	, TO STACK
7DF1 6D	8C E6	02220	TST	<SESW,PCR	, SCRN EDIT?
7DF4 1026	00F2	02230	LBNE	SCNEDT	, IF SO
7DF8 C6	60	02240	LDB	##60	, CRSR CHR
7DFA E7	9F 0088	02250	STB	CURS	, IN CASE BSP
		02260 *			
7DFE 81	03	02270 CHBR	CMPA	#3	, BREAK KEY?
7E00 26	2B	02280	BNE	CHKAUT	, NO

You'll never shop in the dark again with A+ BUYERS GUIDE! This is the most comprehensive directory of hardware, software, peripherals and services for the Apple II, II+, IIc, IIe, Lisa and Macintosh on the market today. Published every six months, you get the current information on just about every Apple and compatible product and service!

Over 3,500 listings covering business, educational, personal and recreational software...PLUS modems, disk drives, plotters and printers, expansion units, terminals, game devices, and voice and sound related hardware...PLUS furniture, professional societies, user groups, maintenance, insurance and duplication services, on-line bulletin boards and more! Complete with the essential information you need to evaluate what each product does and what you need to use it!



ORDER YOUR
COPY TODAY!

A+ BUYERS
GUIDE is also
available at your
local newsstand,
bookstore and
computer store.

FROM THE PUBLISHERS OF
A+, THE INDEPENDENT GUIDE FOR APPLE COMPUTING

A+ BUYERS GUIDE MF4C

CN 1914, Morristown, NJ 07640

Please send me A+ BUYERS GUIDE.
Enclosed is \$7.50 (\$5.95* per copy plus \$1.55 postage and handling each). (Outside USA \$9.00 US funds only.) *Residents of CA, CO, CT, DC, FL, IL, MA, MI, MO, NJ and NY State add applicable sales tax.

Charge my:

AMEX Visa MC

Card No. _____

Exp. Date. _____

Mr. / Mrs. / Ms. _____ print full name

Address. _____

City. _____

State / Zip. _____

APPLE CART

Yes, a Color Mac; the width myth;
Thunderscan; Hyperdrive hard disk;
Alphacom Daisywheel

John J. Anderson

Happy Spring to you all, Apple Fans. Lots has been going on in the Orchard lately, and the real task of the Apple Cart is deciding what will be included, as opposed to what won't. There are so many products and issues that fairly cry out for mention, and our space is limited.

Our II series maven Mr. Linzmayer has been so buried with work that his IIc coverage did not make it to us by press time—rest assured the next column will be devoted solely to the II series. We have heard from many of you concerning splitting the Apple Cart, and are giving the idea serious consideration. Perhaps we will devote a new feature to "desktop metaphor machines," so the Cart can return specifically to the Apple II series. Owen is evaluating his IIc LCD for next month.

Color Mac Sighted

You may or may not remember the caution we originally attached to that most ubiquitous of Mac rumors: color. I suggested in the July 1984 *Creative* that holding one's breath was inadvisable, for the appearance of a color Macintosh was very far off. That advice was, and remains, on the mark.

But confirmation has arrived. It has taken a year, but we have heard from an unimpeachable source about a color version of the Macintosh computer. We don't know very much more than that at least one unit exists, and that some privileged personnel have had an opportunity to see it.

And when will we finally get to see it? Well, if the long-awaited Commodore Amiga machine finally makes its debut, sporting Mac-like capabilities in color for the cost of a monochrome Mac, Apple may begin to think about an early introduction of its own hi-res color machine. If Atari's ST series machines are viable and begin to ship, this will add to the Color Mac pressure. Our only hope is that the color resolution will be up to snuff. Anything less than crystal clarity, rivaling that of the monochrome Mac, will be unacceptable.

The Width Myth

Is the Apple Macintosh, with its Motorola 68000 processor, a 16-bit or 32-bit machine? I have pegged it as a 32-bit machine in the past and taken a lot of heat for that. I am fully aware of the

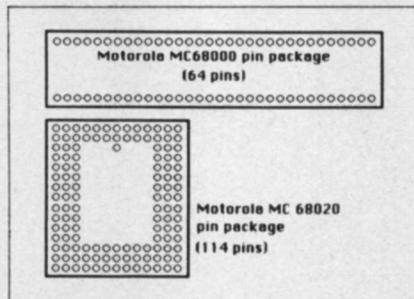


Figure 1.

complexities of the argument, and frankly have ducked the issue as long as possible. Like benchmarks, these sorts of judgments invariably and quickly lead to partisan politics.

Here's a magnificent hedge for you: Although the 68000 has some limitations that cause it to be regarded as a 16-bit MPU, it is probably fair to say that the Mac is as much a true 32-bit machine as the IBM PC is a true 16-bit machine. And IBM zealots have certainly tried to position the 8088 inside the original PC as a 16-bit machine, even though that MPU employs a data path a mere eight bits wide. The 68000 exhibits many of the features of a 32-bit machine, with a 16-bit data path. It uses a 24-bit address bus, which gives it the capability to address 16 megabytes on the fly. All internal registers are 32 bits wide, with the exception of the 16-bit status register. There are 15 general registers, and two stack pointers. Show me another 16-bit processor that can access that kind of memory with such versatility!

Some of you have written to ask if the MC68000 within the Mac can ever be upgraded to the new Motorola 68020, which is, with its 32-bit data path to memory, undeniably a "true" 32-bit microprocessor. The answer to this is no. Although the 68020 supports the 68000

instruction set entirely and is designed to maintain strict software compatibility with its older sibling, its pinouts are not in dual-inline package (DIP) configuration. Rather, the flip side of Motorola's 32-bit chip sports a whopping 114 separate connecting pins in a configuration that might be labeled as a "quad" or "QIP" layout—three pins wide on all but a single side (see Figure 1).

Of course, in addition to the fact that the physical layouts are incompatible, many of the signals that are multiplexed (more than one signal sharing a common circuit) on the 68000 have their own discrete pinouts on the 68020. Although one might imagine some fanciful kludge to surmount these problems, it is realistic to surmise that the effort would not be worth the result. Current Mac circuitry is simply not devised to make use of the advantages of a 32-bit data path. For that we'll have to wait for a new crop of machines.

ThunderScan

Collegiate Owen Linzmayer is now hard at work on a special section for our next graphics issue. It consists of an examination and round-up of digitization packages. In it he compares imaging systems for a wide range of machines. The piece will be quite comprehensive, and I am looking forward to it.

I promised him I would not jump the gun concerning Macintosh imaging systems, but I cannot help but make passing mention of the ThunderScan, from Thunderware, in Orinda, CA. This self-contained hardware and software system does not require an external camera and gives superb results for a total investment of \$230 list.

The ThunderScan is a unique device, which replaces the ribbon cartridge in your Imagewriter printer. You load an original into the printer and the scanning unit sends a digitized image to the Macintosh. Though the process is somewhat lengthy, as it depends on the fixed mechanical speed of carriage returns and incremental linefeeds of the printer, it outputs high quality images. So im-

pressed are we with our results that we have had to fight down the urge to digitize every piece of paper in the lab.

Details of our adventures with ThunderScan will have to wait for Owen's round-up, but suffice it for now to say that working with it is a joy. The software is very good and allows you to view an image in a full-screen window. Images can be saved with all grey-scale information intact (make sure you have some room on disk) or as straight MacPaint documents. Scanning can take place from 25% to 400% of the original image size, and brightness as well as contrast sliders exist in software. The software allows for high contrast or half-

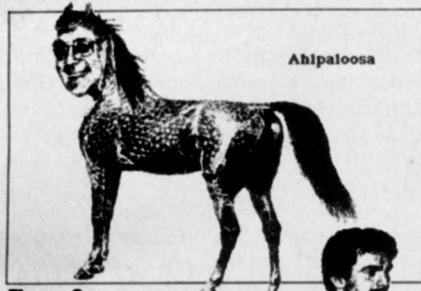


Figure 2.



Figure 3.

tones, and rehalftoning can be effected without having to rescan.

The possibilities of this product are endless, and it has fired up our imaginations quite a bit (Figures 2 and 3). Already our logo has been digitized and is available in the Apple Cart library (DL7) on Creative Computing Online (CompuServe PCS-22). That library will surely grow. Stay tuned for a comparative review of the product. Or better yet, go out and buy one while you're waiting.

Hyperdrive

In February I wrote concerning the Hyperdrive, which you may remember is the 10 meg internal hard disk for the Mac, from General Computer of Cambridge, MA. Well Pax Goodson of GCC drove down the other day to give me a hands-on demonstration of the product.

It's for real, folks, and then some. I watched Pax boot up from hard disk with no floppy inserted. I watched him

boot MacPaint in a matter of seconds. I watched him create a MacWrite document, cut it to the clipboard, close, then open a new document, and do a paste, all in under 12 seconds. This parallel drive, as opposed to external drives which rely on the modem port for serial interface, is fast. It is so fast, you'd be hard pressed to tell that you were not looking at a RAMdisk in action.

The superquiet internal fan doesn't give the RAMdisk impression away either. I have a Tecmar drive, which occasionally does an uncanny impersonation of a Learjet, especially when it's been in use over the course of an entire day. I was fearful that the Hyperdrive fan, inside that potential soundbox that is the Mac, would make the Mac sound like (horror!) an IBM machine. Such is not the case.

According to General Computer, the firm has received orders with a total retail value of over \$2 million since introduction a mere four months ago. Word has it that Steve Jobs said this little hardware miracle could never be created (perhaps he stipulated to his designers that it shouldn't be doable). But here it is, and it makes the Mac work the way it should—fast. I can give no better recommendation than to say that I put in an order on the spot.

The software included with the hardware system is superlative, and features many conveniences to make sector allocation and security measures a breeze to deal with. The downside: installation must be done by your dealer. To reiterate a bit of the February piece, prices are \$2200 for the drive alone, installed, and \$2800 installed alongside an upgrade to 512K.

A full review of the Hyperdrive will appear in an upcoming issue.

Alphacom Letter Quality Daisywheel

The Imagewriter is a pretty darned nice printer for graphics, but let's face it—it isn't exactly the greatest text printer you've ever seen. Mac owners certainly wouldn't want to be without an Imagewriter, but when it comes time for those formal business letters or grant proposals, you might find yourself edging back toward the Selectric. I know I have.

The Mac market is ripe for a low-cost, high quality daisywheel printer, which Mac owners can put inexpensively alongside their existing Imagewriter. The Alphacom Daisywheel is just such a printer, and at \$430 complete

with interface and cable, comes at an unbeatable price.

The specs in brief: the Alphacom Daisy clocks in at 22 cps, in 10, 12, or 15 cpi, with optional proportional spacing. The printer is friction feed only, with a form width of up to 13". The printwheels as well as ribbon cartridges are Diablo and Qume compatible. Buffer size is 93 bytes, expandable optionally to 4K. The Alphacom measures 19" x 5.5" x 12" and weighs 21 lbs.

Print quality is impeccable (Figure 4), and the system runs quietly for a daisywheel. The Alphacom Letter Quality Printer uses inexpensive modular interfaces (\$30 each). Using the Mac-



!"#\$%& ' () *+ , - . /
0123456789 : ; < = > ? @
ABCDEFGHIJKLM
NOPQRSTUVWXYZ
[\] ^ _
abcde fghi jklmn opqr st

Figure 4.

intosh interface, we drove the printer reliably both from the *Daisywheel Connection* and Microsoft *Word*. Setting up the unit is easy, and the accompanying documentation is relatively thorough and competent.

Catch you next month. ■

Firms Mentioned In This Column

Thunderware Inc.
21 Orinda Way
Orinda, CA 94563
(415) 254-6581

General Computer Co.
215 First St.
Cambridge, MA 02142
(617) 492-5500

Alphacom Inc.
2323 S. Bascom Ave.
Campbell, CA 95008
(408) 559-8000

OUTPOST: ATARI

Programs for the home, a new adventure, and unsung heroes

David Small

It is almost summer. As you know, during the summer you can be outdoors doing all sorts of healthy, active things, or you can be inside using the computer. This month I have made it my mission to persuade you to stay inside and avoid the aging effects of the sun rays.

To this end, let's look at a few products that might keep you chained to your Atari.

Wombats I

So you think you've seen everything there is to see in Adventure games? You've saved the Princess, cleansed the realm of ultimate evil, prevented a meteor from colliding with the Earth, and just generally saved the universe from the alien challenge?

Congratulations, you are an adventure burnout. Welcome to the club.

When *Wombats I* arrived, I yawned. I wondered what task (which I had undoubtedly already completed in another game) would await me. Slay a troll? Big Buzz. Find gold? No sweat. So I booted the game up:

"Episode I: Gazumba the Great and the Wombats of Borazoa. You are standing on a large compass. The compass has been made out of hundreds of tiles; the placement of the tiles is extremely exact, and must have caused the being who did the work to go prematurely blind." Without really seeing what was on the screen, I wandered on.

"This is the computer system room, where there are visible remains of several mainframe computers. A host of smaller computers are huddled around them for warmth."

In another room, a mysterious inscription on the wall:

"I sit on my legs, and quietly think about what it all means
about why there is no mayonnaise jam

or how Brooke gets into her jeans." Double take. I was confused. What on earth? Several scenes later it all became clear: *Wombats I* is a parody of adventure games.

I picked up the cover and read:

"Venture with me into a mind-boggling world of strange creatures, killer vegetables, dim-witted robots, and weird happenings. Equipped with an extensive vocabulary and written entirely in Demento-O-Matic machine language for fast, fast, FAST execution, *Wombats I* sports many sophisticated commands heretofore only available elsewhere. The fruit of our labors can now be yours, if you promise not to pirate it all over creation. Boola, boola."

Well, I haven't completed the game yet; it has some pretty hard puzzles. Besides, I'm still enjoying the prose that has been so carefully crafted. No hurry.

Venture with me into a mind-boggling world of strange creatures, killer vegetables, dim-witted robots, and weird happenings.

I recommend this one to experienced Atari adventurers who think they have seen it all. If you are not an experienced adventurer, start with *Zork I* or the Scott Adams series; a lot of the humor in this game is directed at the competition, and if you haven't played the other games, it will fall flat.

A few caveats: The actual game is quite difficult to solve. To me, that is unfortunate. I think the object of a parody adventure should be to expose the player to the maximum number of parodied rooms and such, and if he can't get far into the game, he will not derive maximum enjoyment from the game. The game play is quite uneven in spots; more play-testing might help a lot.

Finally, it is truly copy protected. I mention this because it won't boot on an ATR-8000, and that means other non-Atari drives could have trouble; it seems to depend on the data separation scheme

being used. Atari 810s and 1050s work fine; if you use anything else, test it out first and reserve the right to return the game if it fizzles.

All in all, my rating is Good Enough.

Homepak

Russ Wetmore has done it again. Longtime Atarians remember Russ as the fellow who wrote *Preppie*, one of the classic Atari arcade games. With *Homepak*, Russ has proven that his skill as a programmer extends beyond games.

Homepak, from Batteries Included, is three programs in one: a word processor, a database, and a telecommunications program. What is amazing is that all three programs are pretty good, and the price for all three is \$49.95.

Homepak is written in Action, a language that is emerging as the preferred language in which to develop Atari software; it is fairly high level, but compiles into extremely efficient code. Action is what I had hope Forth would turn out to be—easy to use and powerful enough to drive the Atari to its limits.

The idea of *Homepak* is to combine the functions that a home user might need at a reasonable price.

Hometext, the word processor, is good enough for most home use; it isn't exactly industrial strength, nor can it handle 100K manuscripts (more like 8K). On the other hand, most home users don't write long documents; they write letters and other documents for which Hometext is adequate. It has the usual word processing capabilities; margins, block move/delete, and search/replace. There is also a page setup menu which has many capabilities from justification to footers and line spacing.

Homefind, the database, tries to fulfill the needs of the home user, and to my mind, does this difficult task effectively. With the database, you enter facts you want to be able to recall later, in the following format: "Robert's birthday March 23, 1953"; "Mike's phone's 929-9099"; "Susan's favorite color's yellow"; and save them. Then, you can recall

them with "natural language" commands like "What is Mike's phone?"

This is an interesting idea. It lets you store information that is normally difficult to get into a database, because of the wildly differing fieldnames and lengths. It is not a powerful database in the mold of *Filemanager*; rather, it is a convenient fact file for information. It is also considerably easier to use than *Filemanager* for the sort of information an average home user wants to save.

Finally, there is *Hometerm*, a terminal program. This program lets you use the Atari as a terminal with most modems available today, including those that direct connect (1030), those that work with the 850 Interface, and the MPP series which plugs into the joystick ports. *Hometerm* lets you select baud rate, autodial, upload and download Atari DOS files with XMODEM protocol, and even edit and compose text lines in the program before sending them through the modem.

I like *Hometerm* and think it is easier to use than either *Telelink* or *Amodem/Tscope*.

Homepak gives you basic functions at a reasonable price. It is a real rarity on the market today, an excellent program at a bargain price.

(If you need a really powerful word processing/database/telecommunications program and can bear the tariffs let me suggest the following: pick up an ATR-8000 with as much disk storage as you need and get the CP/M-80 versions of *WordStar*, *dBase II*, and *Modem7*. You'll find that CP/M has the necessary disk I/O speed and power to handle most problems. On the other hand, you're going to put a real drain on your checking account balance by the time you're done, so consider carefully "how fast you want to go".)

CompuServe

Many Atari users now dial into CompuServe and visit the Atari SIG (Special Interest Group) there. If you have never tried out a bulletin board system, think of a shopping center "bulletin board" that thousands of users can post bulletins on and respond to daily, and you'll get the idea. It is the place to pick up rumors, ask questions, and get some good answers. The operators of the Atari SIG are among the most knowledgeable of Atari programmers (Russ Wetmore, mentioned above; Steve Ahlstrom and Dan Moore, who did *SynCalc* from Synapse; Ron Luks; and others).

Also on CompuServe, in Creative

Computing Online, you will find *Creative's* own John Anderson and Owen Linzmayer. If you want immediate response to comments about articles, suggestions, and the like, this is the place. I check into *CompuServe* once every few days, so if you leave a message for me in the *Creative Computing Outpost*: Atari area, I'll be able to respond immediately.

The idea of *Homepack* is to combine the functions that a home user might need at a reasonable price.

Dave's Recognition Corner

Finally, this month we have a place where some of the "movers and shakers" in the Atari world can be recognized for their contributions. Each month I'll try to mention a few people who deserve kudos from Atarians.

Joe Miller (formerly of Atari, Inc.): Wrote the operating system, far ahead of its time, for the 400/800 computers. Try to do some of the things Atari programmers can do so easily (such as reading a file a byte at a time) on other machines. You'll really appreciate Joe's work the first time you use another machine's Basic.

Bill Wilkinson (OSS, Inc.): Wrote Atari DOS; then marketed Steven Lawrow's MAC/65, the finest 6502 assembler available for the Atari, and Action. Truly a person whose tools and company played a critical role in software development for this machine.

Ihor Wolosenko (Synapse, Inc.): The person who started and built up Synapse Software, starting with *FileManager 800* and moving to some of the really classic games, including *Shamus*, *Blue Max*, *Dimension X*, and *Protector*. A person who gave many programmers their first chance to write and market an Atari game.

Earl Rice and Mark Cator (formerly of Atari Inc. User Support Group): Two people who put a lot of work into helping user groups, distributing educational tapes, disseminating information, straightening out problems, and helping users. Special thanks for the many trips they made to user group meetings around the country; Earl and

Mark were the only employees of Atari many people ever met.

Delaine Goode, Jill Palmquist, Joe Wagner (Corvus Inc.): Still the only manufacturer of a hard disk for the Atari. Possibly a tool ahead of its time, yet an increasingly popular tool for software developers; much faster than Atari drives (4-8X speedup) and lots of storage (5-20Mb). Delaine, Jill, and Joe have bent over backwards to support Atari users when many perceived the Atari computer as "just a game machine."

Chris Crawford (formerly of Atari, Inc.): One of the people most responsible for the success of the home computer. Helped write an excellent text (*De Re Atari*) on how to use the machine which got many programmers started. He made many personal appearances at user's groups and seminars explaining how the machine works. Chris is also responsible for popularizing the "smooth scrolling" and terrain map techniques which appear in hundreds of Atari programs; they were first seen in his brilliant *Eastern Front*.

He is also one of the most pleasant people I have dealt with at Atari. Chris is now writing programs for the Macintosh.

And finally, **George Blank**, former *Creative Computing* editor, who originated the *Outpost: Atari* column and gave two novice writers (David and Sandy Small) a place for their Atari tutorial series nearly four years back. Many thanks.

See you next month, when I anticipate having some hard information on the ST line (68000 machines) as well as the more secret NSC 32032 32-bit line, as well as our Fourth Anniversary Special. ■

Firms Mentioned In This Column

Dynamic Software Design
P.O. Box 8169
Fremont, CA 94357
(415) 790-9129

Batteries Included
30 Mural St.
Richmond Hill, Ontario
L4B 1B5
(416) 596-1405

CompuServe Information Service
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, OH 43220
(800) 848-8199
(614) 457-8600

CREATIVE COMPUTING RETAIL ROSTER

ARIZONA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals.

CALIFORNIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ANAHEIM—330 E. Ball Rd., (714) 776-8420. CAMPBELL—2350 S. Bascom Ave., (408) 377-8920. EL CERRITO—6000 Potrero Ave., (415) 236-8870. LA MESA—8363 Center Drive, (714) 461-0110. LOS ANGELES—2309 S. Flower St., (213) 749-0261. MONA—1555 N. Orange Grove Ave., (714) 623-3543. REDWOOD CITY—2001 Middlefield Rd., (415) 365-8155. SACRAMENTO—1860 Fulton Ave., (916) 486-1575. WOODLAND HILLS—22504 Ventura Blvd., (213) 883-0531.

COLORADO

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. DENVER—5940 W. 38th Ave., (303) 422-3408.

CONNECTICUT

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. AVON—395 W. Main St. (Rt. 44), (203) 678-0323.

FLORIDA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. HIALEAH—4705 W. 16th Ave., (305) 823-2280. JACKSONVILLE—8262 Arlington Expressway, (904) 725-4554. PLANTATION—7173 W. Broward Blvd., (305) 791-7300. TAMPA—4109 Hillsborough Ave., (813) 886-2541. FT. LAUDERDALE—7173 W. Broward Blvd. (305) 791-7300.

GEORGIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. ATLANTA—5285 Roswell Rd., (404) 252-4341.

HAWAII

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. HONOLULU—98-1254 Kaahumanu St., Pearl City, (808) 487-0029.

ILLINOIS

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. Chicago—3462-66 W. Devon Ave., (312) 583-3920. DOWNTOWN GROVE—224 Ogden Ave., (312) 852-1304.

INDIANA

INDIANA HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. INDIANAPOLIS—2112 E. 62nd St., (317) 257-4321.

KANSAS

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. MISSION—5960 Lamar Ave., (913) 362-4486.

KENTUCKY

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. Louisville—12401 Shelbyville Road. (502) 245-7811.

LOUISIANA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. KENNER—1900 veterans, Memorial Hwy., (504) 467-6321.

MARYLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. BALTIMORE—1713 E. Joppa Rd., (301) 661-4446. ROCKVILLE—5542 Nicholson Lane, (301) 881-5420.

MASSACHUSETTS

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. PEABODY—242 Andover St., (617) 531-9330. WELLESLEY—165 Worcester Ave., (617) 237-1510.

MICHIGAN

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. E. DETROIT—18149 E. Eight Mile Road, (313) 772-0416. FARMINGTON HILLS—29433 Orchard Lake Road, (313) 555-4171.

MINNESOTA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. HOPKINS—101 Shady Oak Road (612) 938-6371. ST. PAUL—1645 White Bear Ave., (612) 778-1211.

MISSOURI

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. ST. LOUIS—3794 McKelvey Road (314) 291-1850.

NEBRASKA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. OMAHA—9207 Maple St., (402) 391-2071.

NEW YORK

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. AMHERST—3476 Sheridan Dr., (716) 835-3090. ROCHESTER—937 Jefferson Rd., (716) 424-2560. N. WHITE PLAINS—7 Reservoir Rd., (914) 761-7690. Jericho, L.I.—15 Jericho Turnpike, (516) 334-8181.

NORTH CAROLINA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. GREENSBORO—4820 W. Market St., (919) 299-5390.

OHIO

NORTH COAST COMPUTERS, 650 Dover Center, Bay Village 44140, 216-835-4345. 100 N. Main, Chagrin Falls. Apple, Lisa, Vector Graphics, Hewlett-Packard. (216) 247-2202.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. CINCINNATI—1013 Springfield Pike, Woodlawn, (513) 771-8850. CLEVELAND—28100 Chagrin Blvd., (216) 292-7553. COLUMBUS—2500 MORSE ROAD, (614) 475-7200. TOLEDO—48 S. Byrne Road, (419) 537-1887.

OKLAHOMA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. OKLAHOMA CITY—2727 Northwest Expressway. (405) 848-7593.

PENNSYLVANIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. PHILADELPHIA—6318 Roosevelt Ave., (215) 288-0180. FRAZER—630 Lancaster Pike, (Rt. 30), (215) 647-5555. PITTSBURGH—3482 Wm. Penn Hwy., (412) 824-3564.

RHODE ISLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. WARWICK—558 Greenwich Ave., (401) 738-5150.

TEXAS

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. DALLAS—2715 Ross Ave., (214) 826-4053. FORT WORTH—6825-A. Green Oaks Road. (817) 737-8822. HOUSTON—1704 W. Loop N., (713) 869-5263. NORTH HOUSTON—5050 FM 1960 West (713) 583-1163. SAN ANTONIO—7111 Blanco Road, (512) 341-8876.

UTAH

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. MIDVALE—58 East 7200 South, (801) 566-4626.

VIRGINIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ALEXANDRIA—6201 Richmond Hwy., (703) 765-5515. VIRGINIA BEACH—1055 Independence Blvd., (804) 460-0997.

WASHINGTON

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers. Software, Peripherals. SEATTLE—505 8th Ave., North, (206) 682-2172. TUKWILA—15439 53rd Ave., South, (206) 246-5358. VANCOUVER—516 S.E. Chaklov Dr., (206) 254-4441.

CREATIVE COMPUTING DIRECTORY

PUBLICATIONS CATALOGS

PC BUYERS GUIDE

THE INDEPENDENT GUIDE TO PRODUCTS AND SERVICES FOR IBM Personal Computers. This master directory lists, describes, rates for ease of use, and tells you about the latest in software, hardware, accessories, supplies, books, services, etc. Everything for you and your IBM PC. It even includes an Index of Computer Camps for both adults and children. From the publishers of PC. An ideal gift at only \$7.95 (+ \$1.55 shipping/handling) to U.S. destinations; and \$11.00 elsewhere. Residents of CA, CO, CT, DC, FL, IL, MA, MD, NJ, and NY add applicable sales tax. Checks or MasterCard or VISA acceptable (with number, expiration date and signature). U.S. funds only. Mail to:

PC BUYERS GUIDE
CN 1914
Morristown, NJ 07960

ACCESSORIES/ SUPPLIES

PROGRAM PACKAGING, DISKS

Complete program packaging line. D-Ring cloth binders, slipcases, floppy pages, game portfolios. Vinyl binders with clear pockets on covers. Blank disk envelopes. Low prices on BASF, KODAK disks. Many supplies for users, software developers. Call, write for prices. CATALOG. Fast friendly service, low prices.

ANTHROPOMORPHIC SYSTEMS, LTD.
376 E. St. Charles Rd.
Lombard, IL 60148
(312) 629-5160

SOFTWARE/GENERAL

RENT PUBLIC DOMAIN SOFTWARE

It's not copyrighted, no fees to pay. Copy hundreds of useful business, utility and game programs from our rental libraries onto your own computer at home! CP/M user group library \$45. IBM PC-SIG \$230. KUG library \$25. Send \$5 P.P. for a catalog disk. SASE. NATIONAL PUBLIC DOMAIN LIBRARY
1533 Avohill
Vista, CA 92083
(619) 941-0925. 3 minute recording tells all, (619) 727-1015.

TAPE TO DISK CONVERSION

CONVERSION SERVICES

Convert any 9 track magnetic tape to or from over 200 formats including 3½", 5¼", 8" disk formats & word processors. Disk to disk conversions also avail. Call for more info.

PIVAR COMPUTING SERVICES, INC.
47 W. Dundee Rd.
Wheeling, IL 60090
(312) 459-6010

CREATIVE COMPUTING MART

Now available For the computer experimenter!

COMPUTER CONNOISSEUR'S DELIGHT!
NOW BE IN CONTROL WITH YOUR COMPUTER - THE ONLY PUBLICATION OF ITS KIND WRITTEN FOR THE USER. DISCOVER THE SECRETS AND LEARN THE VERSATILITY OF MODERN COMPUTER COMMAND CONTROL COMPUTERS. LEARN HOW TO PROGRAM YOUR COMPUTER AND HOW IT CAN INTERFACE THEM LEARN HOW THEY WORK. WHAT THEY DO. AND HOW TO GET THEM TO WORK FOR YOU. A COMPLETE TELEPHONE ENGINEERING COURSE IS INCLUDED. MODERN COMPUTER PROGRAMMING THROUGH STEP, CROSSBAR, ESS, BUBBLE, AND ATOMIC SWITCHING SYSTEMS. EXCLUSIVE COVERAGE OF BIOLOGICAL COMPUTING SYSTEMS. TOO! COMPUTER TELEPHONES. THE FUTURE OF THIS PUBLICATION IS AN ABSOLUTE MUST FOR EVERYONE INTERESTED.



The one you've all been waiting for
NOW AVAILABLE - Learn how to run telephones and telephone systems; how they work, in monthly installments with the magazine for you.

UNPUBLISHED MATERIAL
WIT
COMICS
DIRECTORY LISTING
NET.
WORKS
AC-
CSES
CODES
Computer
PUBLISHED MONTHLY
ONE YEAR SUBSCRIPTION \$14.00
(SAMPLE COPY \$1.00)
SUBSCRIPTION & 2 PROGRAMS \$20.00
Credit Card Only 1-800-6-COMPUTER (Everyone EXCEPT California)
1-800-5-COMPUTER (Call) Call Only

COMPUTEL—the complete SOURCE for everyone. You can now do the things you've only heard about, right in the privacy of your own home. Indispensable reference to phreaks and hackers. Learn how to get all kinds of computer programs FREE. Get the inside story on big business systems, software, quirks and flaws—any reason to do with vital occurrences within the computer industry. Computel is a publication designed for everyone who has an intense curiosity of computer systems, containing a wealth of hard to find information, codes, and numbers. Published monthly.

Computer Publishing Society
6354 VAN NUYS BL., #161-C/VAN NUYS, CA 91401

CIRCLE 306 ON READER SERVICE CARD

COMPUTER & SOFTWARE PROTECTION from PENGUIN

K-COVER
An anti-static, unbreakable, Computer keyboard protector.
FP882 w/o hinges - \$7.95 ea.
FP884H w/hinges - \$9.95 ea.
For most micro-computer keyboards to 5" X 14"**
FPB88H, IBM PC & most compatible keyboards
to 5" X 17" - \$12.95
FPB88H, Macintosh & Apple IIc - \$10.95
LIFETIME GUARANTEE AGAINST BREAKAGE

strongbox
Holds up to 8-5 1/4" Diskettes
TOLL FREE 1-800-336-6875
SP-1202 CASSETTE \$2.95 ea.
Both available with EMI Shield - \$4.49 ea.
Colors-Black, Grey, Blue, Green, Putty, Yellow, Almond, Melon, Red

MONITOR STANDS
TILT 25° & SWIVEL 360°
1400. Universal - \$29.95 ea.
1450 Macintosh - \$29.95 ea.

1900. Universal with Surge Protector/Filter, 4 Power Outlets, Illuminated Control Switch, & Circuit Breaker - \$89.95 ea.

PAINTED METAL PS1680. 80 Column Printers - \$29.95
PS1682. 132 Column Printers - \$36.95
PRINTER STANDS PS1685. Apple Macintosh Printer - \$29.95

MOST ITEMS SHIPPED
IN TIME FOR CHRISTMAS
INCLUDE \$1.50 SHIPPING
CHECK, MONEY ORDER,
VISA & MASTERCARD ACCEPTED.
Call toll-free 1-800-732-0614
In Mich. (313) 774-2228

Penguin Products
P.O. Box 7006
Roseville, MI 48305-7006

CIRCLE 307 ON READER SERVICE CARD

NEW Monitor Mover Gives Back the Desk

\$159.95

- Models to fit most CRT's
- Rotates 360° on base
- Adjustable height
- Support tray swivels and tilts
- Holds up to 50 lbs
- Clamp, screw and wall mountings

LinTek

P.O. Box 8056
Grand Rapids, MI 49508
(616) 241-4040



Lifetime Warranty—100% Certified
***FREE UPS DELIVERY**

5 1/4"	\$105	BULK	89¢
SINGLE SIDE SINGLE DENSITY 40 TPI W/HUB RING	each Packed 10 per Soft Pack	100/Case W/Hub Envelope	each
5 1/4"	\$125	BULK	\$107
SINGLE SIDE SINGLE DENSITY 40 TPI W/HUB RING	each Packed 10 per Soft Pack	100/Case W/Hub Envelope	each
5 1/4"	\$165	BULK	\$142
DOUBLE SIDE DSD 40 TPI W/HUB RING	each Packed 10 per Soft Pack	100/Case White Envelope W/Hub Ring	each

24 Hour Order Desk

TOLL FREE
NAT'L 1-800-634-2248

Visa, MasterCard, Cert. chk., M/O, C.O.D. cash.
Get immediate shipment. Schools & govt. on P.O. #.
Personal or company checks held 14 days.
APO, FPO. Can. and other non-UPS delivered, add \$5.

*Free delivery on minimum orders of \$50 or more. Others add \$2 for S & H.

Software Services

1323 23rd Street South, Suite C-2, Fargo, ND 58103 1-701-280-0121

wabash

Warranted Integrity,
Incredible Value

DISKETTES



M11	5 1/4"	\$1.19
M13	5 1/4"	\$1.29
M14	5 1/4"	\$1.59

SOLD IN BOXES OF TEN ONLY

tremendous selection of software books, accessories and supplies

UP TO 50% OFF!

Software for IBM PC

dBase III	349	Multimate	269
Framework	349	Symphony	419
Home Acct. Plus	89	Wordstar 2000	279
" w/Ultifile	149	Wordstar Pro Pac	249

ABOVE SOFTWARE AVAILABLE IN OTHER FORMATS, CALL FOR AVAILABILITY AND PRICE.

Minimum shipping and handling \$2.00. California residents add 6% sales tax.

Prices subject to change without notice. Write for our free catalog.

ABC data products

3315 ADAMS AVE, SAN DIEGO, CA 92116

619-283-5488 800-854-1555

CIRCLE 301 ON READER SERVICE CARD

Dysan DISKETTES

LIFETIME WARRANTY

Box of ten 5 1/4" soft or hard sectored Dysan diskettes with envelopes, labels and reinforced hub-rings.

SS/DD	\$19.95	DS/DD	\$29.95
SS/QD	\$34.95	DS/QD	\$42.95

EPSON PRINTERS — SALE

Dot Matrix, Bidirectional with Logic Seeking, Paper Feed and Tractor Feed:

RX 80 100 CPS	\$239.00
RX 80 F/T 100 CPS	\$285.00
RX 100 100 CPS	\$469.00
FX 80 160 CPS, 2 K Buffer	\$395.00

Shipping and Handling \$3.00 for any size order of diskettes, \$9.00 for printers, C.O.D. orders add \$1.65. We accept credit cards at NO extra charge. Illinois residents please add 7% sales tax.

Call now TOLL FREE ANYWHERE in the US
Nationwide 1 800 336-6875
Illinois 1 800 942-5200
International 1 312 256-4456
9 a.m. - 6 p.m. (Central) Mon. through Fri.

Call now TOLL FREE ANYWHERE in the US
Nationwide 1 800 336-6875
Illinois 1 800 942-5200
International 1 312 256-4456
9 a.m. - 6 p.m. (Central) Mon. through Fri.

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

P.O. Box 297
Winnetka, IL 60091
1312/256-4456

SMART DATA INC.

MEMOREX FLEXIBLE DISCS

WE WILL NOT BE UNDER-SOLD! Call Free (800)235-4137 for prices and information. Dealer inquiries invited and COD's accepted.



CIRCLE 321 ON READER SERVICE CARD

Eeprom Eraser & Programmer At Unbeatable Prices

L68A EPROM ERASER
\$44.90

LA67 EPROM ERASER
\$59.50

MP32KB PROGRAMMER
\$169.00

MP-100 PROGRAMMER
\$389.00

PA12 AC ADAPTER
\$4.75

Wall plug power adapter for MP32KB and MP-100 PROM Programmers.

Mail orders: Please add \$3.00 handling NJ residents: Please add 6% sales tax

ANGO ELECTRONICS CORPORATION
Box 112, Harrison, NJ 07029
212-685-6336

CIRCLE 307 ON READER SERVICE CARD

MINI-VAC NEW MICRO-CLEANER

MINI-VAC, a revolutionary tool designed to remove minute particles of dust from computers, lenses and other delicate equipment. Unlike compressed air, which disperses the pollutants, MINI-VAC vacuums them away into a removable bag. Compact, efficient, inexpensive and completely portable. MINI-VAC comes with two soft brushes, two directional wands and an easy to empty bag. DC or AC powered (adapter optional). ORDER MINI-VAC #100MV. ONLY \$29.95 + \$3.00 shipping. AC adapter #300MA \$9.95 + \$1.50 shipping. NY Res. add tax. BUYUS, INC., Dept. CC585, 10 White Birch Dr., Ossining, NY 10562. VISA or MasterCard (914) 762-4799.

CIRCLE 309 ON READER SERVICE CARD

MARYMAC INDUSTRIES INC.

800-231-3680

Radio Shack TRS-80's® EPSON PRINTERS

People you Trust to give you the very best!



Model 1000



Epson Printer

- Lowest Price
- Reliable Service
- Quality Products

"World's Largest Volume TRS-80 Dealer"

22511 Katy Fwy., Katy (Houston) Texas 77450
(713) 392-0747 Telex 774132

★MICROCOMPUTER★ BUSINESS SOFTWARE

MEDICAL MGMT...
DENTAL MGMT...
INSURANCE AGENT
LEGAL BILLING.....
PROPERTY MGMT..
AND MUCH MORE !

UNIVAIR INTERNATIONAL
9024 St. Charles Rock Road
ST. LOUIS, MISSOURI 63114

(314) 426-1099

CIRCLE 314 ON READER SERVICE CARD

COMPUTER T'SHIRTS



FOR HOME, SCHOOL,
AND OFFICE!

A MUST for all computer lovers!

BRIGHT GREEN (LCD LETTERS)
CUSTOM SILKSCREENED ON 50/50 BLEND

— HIGH TECH DESIGN! —

Five popular styles to choose from
Order Today! Only \$8.95 ppd.

Made in U.S.A. Simply select Shirt & Color below

LET'S SEEK, PEAK & POKE (#1): White #1 Pink #2 Blue #3
TAKE A BYTE OUT OF ME (#2): Green #4 Grey #5 Red #6
I'M USER FRIENDLY (#3): Black #7
HAPPINESS IS A PROGRAM THAT WORKS (#4):
I ♥ COMPUTERS (#5): CUT
Please send me:
Shirt _____ Color _____ Size _____ / Shirt _____ Color _____ Size _____
Use additional sheet if necessary

COMPUTER NOVELTY CORP.
P.O. BOX 2964
FREEPORT, TEXAS 77541

Enclose \$8.95 ppd each Tx Res 6% tax.

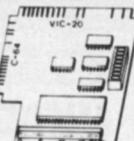


NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
169 ©cnc

CIRCLE 317 ON READER SERVICE CARD

COMMODORE 64 & VIC-20

MULTIPLEXED DIGITAL VOLTMETER Only \$79



FEATURES

- 16 Channel A/D converter (0-5V range)
- High accuracy (1/2% of full scale)
- Simple to use (one BASIC statement)
- Plugs into either VIC-20 or C-64

Great for engineering experiments, Science Fair projects, household monitoring of temperatures, solar intensity, position sensing, etc.

Get professional results, inexpensively!
It's a safe learning tool for the student.

Send check or money order or request our free brochure.

DRIVER ELECTRONICS
797 Overhill Drive Dept. T
Hayward, CA 94544

California residents add 6% sales tax.

CIRCLE 314 ON READER SERVICE CARD

COMMODORE 64 INTERFACING BLUE BOOK

Written by a college professor in a friendly and informative style, this book is a gold mine of practical information on how to build a variety of useful interfaces for your computer. Over 30 projects including cassette interface, printer interface, expansion bus, light pen, RS-232 interface, more user ports, thermometer, speech synthesizer and two other voice projects, A/D and D/A converters, 5 telephone interfaces including a sophisticated voice mail project, motor controllers, AC power control, logic analyzer, capacitance meter, spectrum analyzer, home security system and many more. \$16.95 postpaid. Foreign orders add \$3 for AIR MAIL shipping.

VIC 20 INTERFACING BLUE BOOK

30 hardware interfacing projects for the VIC 20. Similar to the 64 book above. See what your VIC can do with a little interfacing. \$14.95 postpaid

MICROSIGNAL PRESS
Dept B, P.O. Box 388 Goleta, CA 93116

CIRCLE 312 ON READER SERVICE CARD

SAVE ON MEMOREX DISKETTES

\$159 ea. 5 1/4" SSDD
Qty. 20 \$289 ea.
5 1/4" DSDD
Qty. 20

5 1/4" SSDT-96TPI \$2.49 ea. 5 1/4" DSDD-96TPI \$3.25 ea.
Boxed in 10's with Tyvec sleeves, reinforced hubs and labels.

DISKETTES FOR MACINTOSH & HP-1000
AT TERRIFIC SAVINGS!
3 1/2" Memorex
See our big ad in this issue for other great values!
Shipping: 5 1/4" or 3 1/2" DISKETTES—Add \$3.00 per 100 or fewer diskettes. Payment: VISA and Mastercard accepted. COD orders only, add \$3.00 handling charge. Taxes: Illinois residents, please add 8% sales tax.

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!

Nationwide: 1-800-621-6827

Illinois: 1-312-944-2788

Hours: 9AM - 5PM Central Time

Minimum Order: \$35.00

DISK WORLD!, Inc.

Suite 4806 • 30 East Huron Street • Chicago, Illinois 60611

MEMOREX

CREATIVE COMPUTING MARKETPLACE

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** \$3.50. **EXPAND-AD[®]:** \$5.25. Ads set in all bold type at 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)—or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, CREATIVE COMPUTING Magazine, 1 Park Avenue, New York, N.Y. 10016. To charge your ad to a major credit card, call Lois Price at (212) 503-5115. For Customer Service, call (212) 503-4506.

SOFTWARE

HORSE & DOG HANDICAPPING PROGRAMS FOR MOST PERSONAL COMPUTERS. Free Catalog: Gambler's Edge Computing, Dept B4, 250 Richards Rd., Ste. 254, Kansas City, MO 64116.

COMMODORE 64/VIC 20 Games/educational software. Over 4000 titles! Write for FREE catalog! American Peripherals, 122 Bangor St., Lindenhurst, NY 11757.

TI-994A SOFTWARE/HARDWARE bargains. Hard to find items. Huge selection. Fast service. Free catalog. DYNAMO, Box 690, Hicksville, NY 11801.

FIND THE RIGHT SOFTWARE. Custom listing for your task, hardware, and budget. Send for introductory offer. Soflist Co., 1513 No. Wilcox, Suite 547, Los Angeles, CA 90028.

TRY BEFORE YOU BUY!!! TI-Users save money by renting software from the SOFTWARE USERS EXCHANGE, Dept. E, P.O. Box 49, Cumberland, PA 17070. Free Brochure!

CONTRACT BRIDGE GAME software—\$39.95. Apple, IBM, TI99-4A, Commodore 64-16-VIC-+4, TRS 80-1-3-4-CoCo. Others. Immediate shipment. Send check to Authors: John and Lynda Allan, Azilda, Ontario, POM1B0, Canada. (705) 983-4341.

HARNESS AND THOROUGHBRED HANDICAPPING PACKAGE ... \$29.95. FREE INFORMATION! SOFTWARE EXCHANGE, Box 5382, West Bloomfield, Michigan 48033.

IBM-PCjr owners, we have the affordable software you want. Free catalog. Owl Software, 1435 Burnley Square No., Columbus, OH 43229.

FREE TIMEX, C-64 & IBM programs. Specify computer. Send \$1.00 for details. JPR-SW, P.O. Box 4155, Dept. C-E. Winterpark, FL 32793.

SANYO SOFTWARE AND PERIPHERALS. Great prices MIGRAPH software. Call toll free 1-(800) 554-7274.

TEACHERS!! Recording and reporting classroom grades is a breeze with PCGRADER. Four levels of grades provided. Reports grades for one grading period or combined grading periods, with or without names. Menu driven with help facilities. IBM-PC version, only \$40. Requires 192K. LAF SOFTWARE, 3 Kiowa, Los Alamos, NM 87544.

NEW SELF-IMPROVEMENT SOFTWARE. Listens, affirms, responds to you. FREE brochure. Box 1884-B, Boston, Massachusetts 02105. (617) 492-1678.

ELIZA. This classic artificial intelligence program is fascinating, surprising, always entertaining. C64 disk \$9.95. P&H free! HTE America, 7010A, Tree Lane, Madison, WI 53717.

FLIGHT SIMULATOR FOR T199/4A. This is not a game but a realistic IFR simulation. TV screen shows detailed panel (plus simple display to permit VFR landings). Panel includes all flight instruments. ILS, MKR, TACH, fuel, flaps, Fast: responds within 1 second. See review in June 83 AOPA Pilot. Only equipment needed is cassette and joy-stick. Send U.S. \$30 (U.S. \$32 for foreign) to John T. Dow, 6560 Rosemoor, Suite 8, Pittsburgh, PA 15217. (PA residents add \$1.80 tax). Write, or call (412) 521-9385 for information. VISA and MC accepted.

FREE PROGRAMS! TI99/4A/all Commodores, TRS-80's, Timexes. Send postage stamps! EZRAEZR, Box 5222-RMY, San Diego, CA 92105.

DISCOUNT priced software and accessories for major micros. Friendly, prompt service. Free catalog, seasonal specials. Ascus Micro, 680C Northland Blvd., Cincinnati, OH 45240, 1-(800) 543-1114 or 1(513) 825-5803.

MC10 ARCADE GRAPHICS MOON LANDER \$9.95. 2 K-TS1000 budget \$9.95. Rambam 617 Constitution, Orlando, FL 32809.

SOFTWARE/EDUCATIONAL

EDUCATIONAL SOFTWARE. Large selection. All grade levels. Discount prices. Write for FREE catalog stating computer model. GET SMART, Box 1067, Rockville Centre, NY 11571.

SOFTWARE/GAMES

SHOOT'N LETTERS CP/M invaders-like typing game. Only \$29.95. Contact WDPA, 132 Sprague, Portsmouth, RI 02871. (401) 683-9125.

BUSINESS OPPORTUNITIES

\$3000.00 per month spare time income with your computer! Free details. Digitek Corporation, 2723 West Butler Drive, Suite B, Phoenix, AZ 85021.

PROJECTION TV MAKE-\$\$. Assembling Projectors ... Easy ... Results comparable to \$2,500 projectors. Your total cost less than \$20.00. PLANS, 8" LENS & Dealers information \$17.50 ... Illustrated information FREE ... Macrocoma-CIX, Washington crossing, Pennsylvania 18977. Creditcard orders 24 hours (215) 736-2880.

FREE BROCHURE. Repair air conditioning, refrigeration. Tools, supplies, full instructions, Doolco Inc. 11252 Goodnight, Suite 600, Dallas, Texas 75229.

OWN A WORD PROCESSOR? Earn part or full time income at home or office. 224 page manual. \$16 or write for details. Fires Inc., 1450 67th St., Emeryville, CA 94608.

HOW TO GET RICH with your microcomputer. Super opportunities. \$9.00. Scitec, Box 02038, Columbus, OH 43202.

COLORADO DIRECTORY OF 200+ potential high tech computer-related employers. Send \$6 to Colorado High Tech, 330A W. Uintah, Suite 312D, Colorado Springs, CO 80905.

BUSINESS SERVICES

PATENT PROTECTION. Searches, Applications, Licensing. Free Advice. Silicon Valley Patents, 3732 Oakes, Hayward, CA 94542. (415) 886-4440.

COMPUTER EQUIPMENT/SUPPLIES

DISCOUNT COMPUTER SUPPLIES. Write for free catalog. Mail to C.R.E. Wholesale, P.O. Box 361, North Salt Lake, Utah 84054.

DON'T NOTCH THAT DISK! To use both sides of your disk. Modify your read/write protect switch. Instructions and necessary parts included. Send \$12.95 to MicroScot, P.O. Box 768, Rocklin, CA 95677. (916) 624-5636 evenings.

USED COMPUTER terminals, printers, cables, surplus electronic parts. Specials: 9" CRT-as-is-\$10.00. Switching power supply-new-\$37.50. Catalog \$1.00. Rondeur Company, PO Box 35566, Dallas, TX 75235. (214) 630-4621.

SPEECH SYNTHESIZER, Schematics and programs for APPLE, VIC, Comm 64, Color Computer, TRS-80. Uses SPO256-AL2 chip. Plans \$7.00. MICROTALK, 39 Raymond St., Providence, RI 02908.

RS232C MONITOR/TESTER displays signals for problem/connection analysis \$30. Spec Sheet \$2. MARIETTA COMPUTER TECHNOLOGY, 1512 Roswell Road, Suite 110, Marietta, GA 30062.

ASCII KEYBOARDS. Fully Encoded, new, multifeatured, \$35. AppleSoft ROM sets \$60, Apple, Xerox, Bigboard builders send stamp/flyer. Electrovalue, Box 376-PK, Morris Plains, NJ 07950.

COMPUTER PUBLICATIONS

EMPLOYEE MOTIVATIONAL programs publisher looking for original ideas for humorous situations relating to the data processing industry. Will pay \$50 for any idea used. Reply P.O. Box 7287, Wilmington, DE 19803.

"DISK DRIVE MANUAL"—Drive Alignment, Adjustments, Preventive Maintenance, Diagnostics, Troubleshooting, Repairs—Without Special, Expensive Software, Equipment. Comprehensive. \$19.90. Brochure \$1. WILLIAMS, M.S.E.E., 2011 Crescent, Alamogordo, NM 88310.

APPLE ACCESS. Semi-annual index. Over 9000 entries from 25 magazines. \$19.95. For info write Apple Access, Box 4467E, Petaluma, CA 94953.

EMPLOYEE MOTIVATIONAL programs publisher looking for original ideas for humorous situations relating to the data processing industry. Will pay \$50 for any idea used. Reply P.O. Box 7287, Wilmington, DE 19803.

COMMODORE 64

COMMODORE 64 SOFTWARE. Free price list. WMJ Data Systems, Dept. CC64, 4 Butterfly Drive, Hauppauge, NY 11788.

COMMODORE 64 Software-Specify Business, Educational, Utilities, games. \$7.95/disk. Softram, P.O. Box 60, Mason, Ohio 45040.

REAL ESTATE! Multiplan template/investment analysis/multi-variable, terrific! \$39.95/Loan print-out, \$4.00/SomaSet, PO Box 1494, Fairfield, IA 52556.

FUN AND EDUCATION: 64 owners, exciting history games by instructional designer. Send \$3.00 for demonstration disk and price list. Culver Instructional Design, 201 Pamela Drive, Loveland, Colorado 80537.

FOR SALE/BARTER

Computer/Satellite modulators, CCTV cameras, monitors, MATV, Kits. Free video catalog. Phone (402) 987-3771. Dealership available. ATV Research, 13-CE Broadway, Dakota City, NE 68731.

CABLE TV CONVERTERS: Jerrold Hamlin, SB-3, Mini-Code, Zenith, New Jerrold Tri-Mode, VHF Converters. Send SASE, 54¢ postage or call for information. (312) 637-4408. Higgins Electronics, 5143 W. Diversey, Chicago, IL 60639.

CABLE TV CONVERTERS. Police Radar Detectors and Scanners. Send \$1.00 for catalog. Great Lakes Communications, Inc., 0-2026, Chicago Drive, Jenison, MI 49428.

HALON FIRE EXTINGUISHER. (Rechargeable-2BC) will not harm electronic/mechanical equipment. Satisfaction guaranteed-\$49.95. Visa/MC, COD. Homecare, RD #3, Box 3376, Hamburg, PA 15262. (212) 562-3249.

487 RCA TV trouble symptoms and cures, listed by chassis #. \$14.95 ppd. SASE free sample. Woodruff TV, 620 Main, St. Clair, MO 63077.

HARDWARE

Apple Works \$199.! HP Laser Printer \$2990.! Panasonic Senior Partner, Kaypro 16, more! Free Catalog. DCA-1, 445 North Pine, Reedsburgh, WI 53959.

COMPUTER SELECTION MADE EASY: Micros-Mini-Games-Business. Easy to follow guidelines and checklists for selecting the right hardware and software. Complete package \$9.95. Cheques only. Winton Evaluators Ltd., 8113 Wiltshire Blvd., Delta, British Columbia, Canada V4C 4B5.

INSTRUCTION

UNIVERSITY DEGREES! Economical home study for Bachelor's, Master's, Doctorate. Prestigious faculty counsels for independent study and life experience credits. Free Information-Richard Crews, M.D. (Harvard), President, Columbia Pacific University, 1415 Third St., Dept. 2055, San Rafael, CA 94901; Toll Free: (800) 227-1617, Ext. 480; California: (800) 772-3545, Ext. 480.

F.C.C. COMMERCIAL RADIOTELEPHONE LICENSE. Electronics Home Study. Fast, inexpensive! "Free" details. COMMAND, D-165, Box 2223, San Francisco, CA 94126.

IBM AND COMPATIBLES

FREE DEMONSTRATION PROGRAMS. Send formatted diskette and return postage for eight programs. Cheapware, 4038 N. Ninth, St. Louis, MO 63147.

PERSONALS

PENFRIENDS. Foreign, USA. For free information, send name, address: PAPYRUS, 580C, Hwy. 67, Florissant, MO 63031.

PLANS & KITS

PROJECTION TV...CONVERT your TV to project 7 foot picture ... Results comparable to \$2,500 projectors ... Total Cost less than \$30.00 ... PLANS AND 8" LENS \$19.95 ... Illustrated information FREE. Macrocomaci, Washington Crossing, Pennsylvania 18977. Creditcard orders 24 Hours. (215) 736-3979.

MODULAR I/O PORT KITS ... Parallel 8-Bit Input and Output for Models I (\$35), III/4 (\$55), and CoCo (\$50) (requires 5V supply). Send check or money order to: D&A RESEARCH, 400 Wilson Avenue, Satellite Beach, FL 32937, (305) 777-1728.

TIMEX/SINCLAIR

SPEECH synthesizer. Timex: TS2068/1500/1000 specify. ML-program, multiple vocabularies, flexible memory requirements, very intelligible. Comes complete. Includes 273 words. Expandable. \$16.95 p.p. TAD PAINTER, Box 166055, Irving, TX 75016.

NEW T/S PUBLICATION: Quarter S. T/S information four times per year for only \$8.00. Check to WMJ Data Systems, 4 Butterfly Drive, Hauppauge, NY 11788.

TS2068 Floppy Disk Interface and CPM ... here at last. Aerco, Box 18093, Austin, TX 78760. (512) 451-5874.

TIMEX/SINCLAIR/SPECTRUM/QL. Send \$1.00 for our 32 page picture catalog. Sunset Electronics, 2254 East Taraval Street, San Francisco, CA 94116. (415) 665-8330.

TRS-80

Co-Co-Nut Software. Over 500 TRS-80 programs. Write/Call for price list. Site 9, Box 1, R.R. 2 Tofield, Alberta, Canada TOB 4J0. (403) 662-2415.

THIS MAGAZINE IS
AVAILABLE IN MICROFORM
DIRECT INQUIRIES TO:

MICRO PHOTO DIVISION
 BELL & HOWELL
OLD MANSFIELD ROAD
WOOSTER OH 44691
Contact Christine Ellis
Call toll free (800) 321-9881
In Ohio, call (216) 264-6666 collect

THE BUYERS GUIDE

THE MASTER DIRECTORY
OF PRODUCTS FOR THE
IBM PC, PC XT, PCjr
AND MOST COMPATIBLES!

AVAILABLE AT YOUR
LOCAL NEWSSTAND AND
COMPUTER STORE.

SHELF CONSCIOUS?

Now you can organize your copies of
CREATIVE COMPUTING

Now your magazines can be a handsome addition to your decor, well organized, and easy to find, thanks to these durable library-quality cases or binders. They're made of luxury-look leatherette over high-quality binder board. And both styles are custom-designed for this or any other magazine you save, with size, color and imprint selected by the publisher. FREE transfer foil included for marking dates and volumes.



Magazine binders

holds your issues on individual snap-in rods, combining them into one volume. \$7.95 each; 3 for \$22.50; 6 for \$42.95. Mixed titles OK for quantity prices.

Open-back cases

store your issues for individual reference. \$6.95 each; 3 for \$19.75; 6 for \$37.50. Mixed titles OK for quantity prices.

For faster service,
**CALL TOLL-FREE
800-526-0790**
(In NJ only 201-540-0445)

Creative Computing

P.O. Box 5120, Philadelphia, PA 19141

Please send: Cases Binders

TITLE _____ QUANTITY _____

Creative Computing _____

Other: _____

PAYMENT ENCLOSED \$_____ * Add \$1.00 per order for postage and handling. Outside USA add \$2.50 per unit ordered; send US funds only.

CHARGE (Minimum \$10):
 American Express MasterCard
 Visa

Card No. _____ Exp. Date. _____

Signature _____

Print Name _____

Address _____

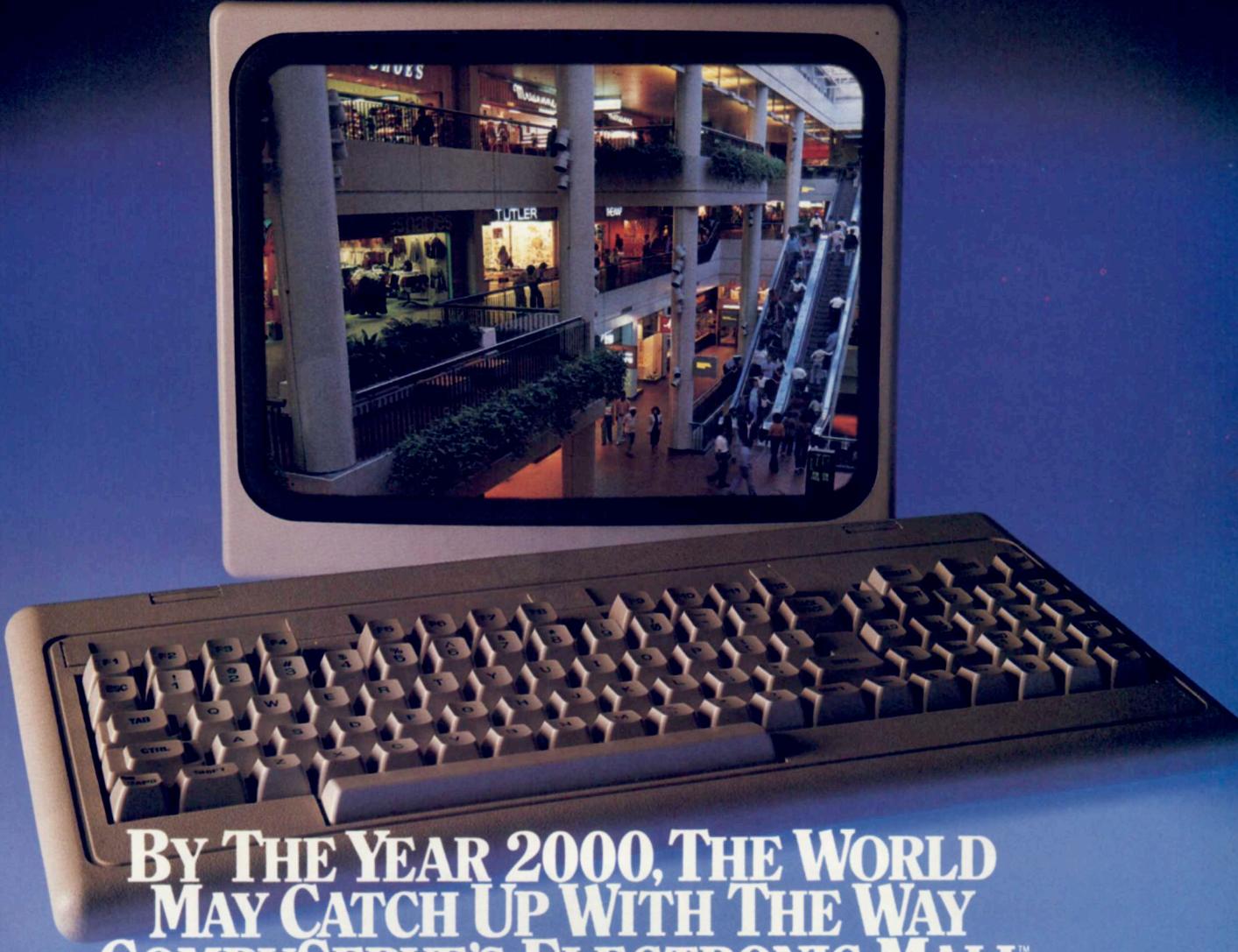
City _____

State/Zip _____

*Residents of PA add 6% sales tax.

INDEX TO ADVERTISERS

Reader Service No.	Advertiser	Page
134	Apricot	72, 73
111	Avatex	10, 11
102	Axiom	31
101	BASF	71
	Batteries Included	58
103	Borland International	1
104	California Microhouse	43
105	Compuserve	Cover 3
106	Computer Discount	53
107	Computer Mail Order	84, 85
138	Computer Solutions	87
108	Conroy La Pointe	28, 29
109	Core Distributing	90
110	Davidson's	55
124	Epyx	74
112	Fastrack	52
140	Grantham Schools	90
139	Howard Sams	13
113	IBM Software	56, 57
180	Indus Tool	36
114	Infocom	63
115	Kensington Microware	79
130	Leading Edge	Cover 4
132	Megahaus Corp.	50
136	Multitech	26
117	Microsoft	24, 25
141	Mycroft Labs	69
118	Nibble Notch	36
137	Oberon International	5
119	Professional Handicapping	87
144	Prometheus	Cover 2
145	Protecto	76, 77
149	Quinsept	89
122	Radio Shack	40, 41
135	RR Software	7
123	Scarborough	9
126	The Source	21
127	Spectre Software	89
128	Sublogic	66
165	SWP	51
129	Tab Books	45
131	Time Works	2
161	Topaz Head	34
142	Xerox	18, 19
133	Verbatim	37



BY THE YEAR 2000, THE WORLD MAY CATCH UP WITH THE WAY COMPUERVE'S ELECTRONIC MALL™ LETS YOU SHOP TODAY.

Presenting the computer shopping service that delivers discount prices, name-brand merchandise, and in-depth product information.

To make your computer even more useful, join CompuServe and shop in our Electronic Mall. Easy enough for beginners, it's open 24 hours a day, 7 days a week. And it offers a wide range of goods and services from nationally known stores and businesses including Bloomingdale's, Waldenbooks, American Express and Commodore.

CompuServe's Electronic Mall™ lets you shop at your convenience in all these departments:

The Auto Shop, Book Bazaar, Financial Mart, Leisure Center, Merchandise

Mart, Newsstand, On-line Connection, Personal Computer Store, Record Emporium, Specialty Boutique and Travel Agency.

Take the CompuServe Electronic Mall 15-Minute Comparison Test.

What you can do in 15 minutes shopping the Electronic Mall way.

- Access descriptions of the latest in computer printers, for instance.
- Pick one and enter the order command.
- Check complete descriptions of places to stay on your next vacation.
- Pick several and request travel brochures.
- Access a department store catalog and pick out a wine rack, tools, toys...anything!
- Place your order.
- What you can do in 15 minutes shopping the old way.*
- Round up the family and get in the car.

The Electronic Mall—A Valuable Addition to the Vast World of CompuServe.

CompuServe Information Services bring you information, entertainment, personal communications and more.

You can access CompuServe with almost any computer and modem, terminal or communicating word processor.

To buy a CompuServe Subscription Kit, see your nearest computer dealer. To receive our informative brochure, or to order direct, call or write:

CompuServe

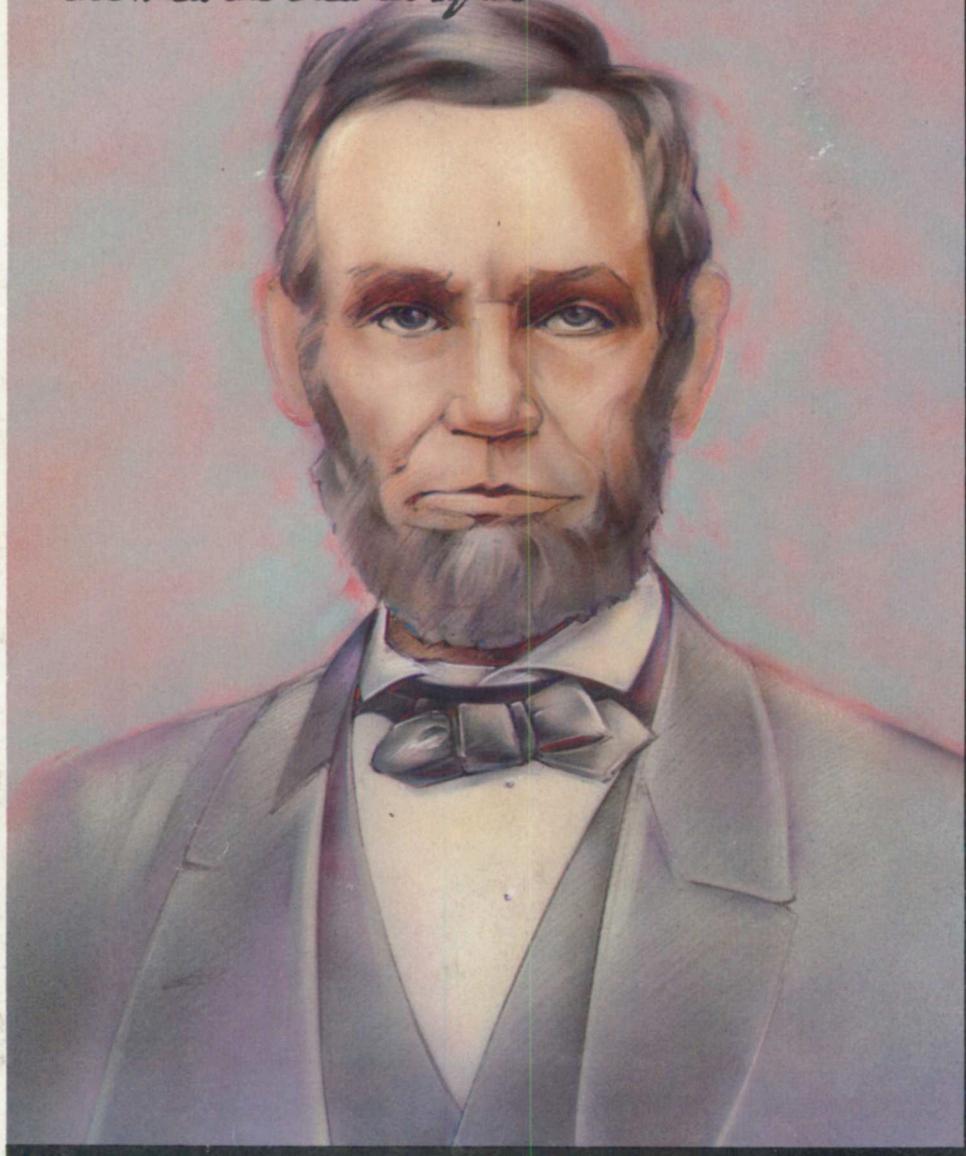
Information Services, P.O. Box 20212,

5000 Arlington Centre Blvd., Columbus, OH 43220

800-848-8199

In Ohio call 614-457-0802

"Now score and seven years ago our fathers brought forth, upon this continent, a new nation, conceived in liberty, and dedicated to the proposition that "all men are created equal."



The picture in this ad is actually an 18" by 24" collector's item—an originally commissioned museum-quality print. This month, the Gettysburg print is yours, absolutely free, at most computer stores that carry Leading Edge Word Processing.

For the name of the dealer nearest you, give us a call.

800-343-6833,
(617) 828-8150.



LEADING EDGE

Leading Edge Products, Inc.
Systems and Software Division
225 Turnpike Street, Canton, MA 02021

WORD PROCESSORS AT THE LEADING EDGE

Ah, the great ones . . .

They organized their ideas, their intuitions, their idioms. They set them down, sorted them out, arranged them and re-arranged them till they came out right.

They used small scraps of paper to record huge hunks of Truth; primitive tools to produce profound prose. But when the words finally went forth, they

made indelible marks on all who read them.

The amazing thing is that these monumental processors of words, did it without the benefit of monumental help.

Like Leading Edge Word Processing: the easiest to use, yet most potent piece of software ever created to take full advantage of all the power inherent, but until now un-tapped, in today's

most sophisticated personal computer. (Like the IBM® PC and the even faster and more powerful Leading Edge® PC.)

The heart and soul of it is a 5 1/4" floppy disk, elegantly logical instruction manual and documentation . . . everything. And what you end up with is word processing at the leading edge.

LEADING EDGE™ WORD PROCESSING FROM \$100

IBM IS A REGISTERED TRADEMARK OF INTERNATIONAL BUSINESS MACHINES CORPORATION.
LEADING EDGE IS A TRADEMARK OF LEADING EDGE PRODUCTS, INCORPORATED.

CIRCLE 130 ON READER SERVICE CARD